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AVIATION

The Oldest American Aeronautical Magazine

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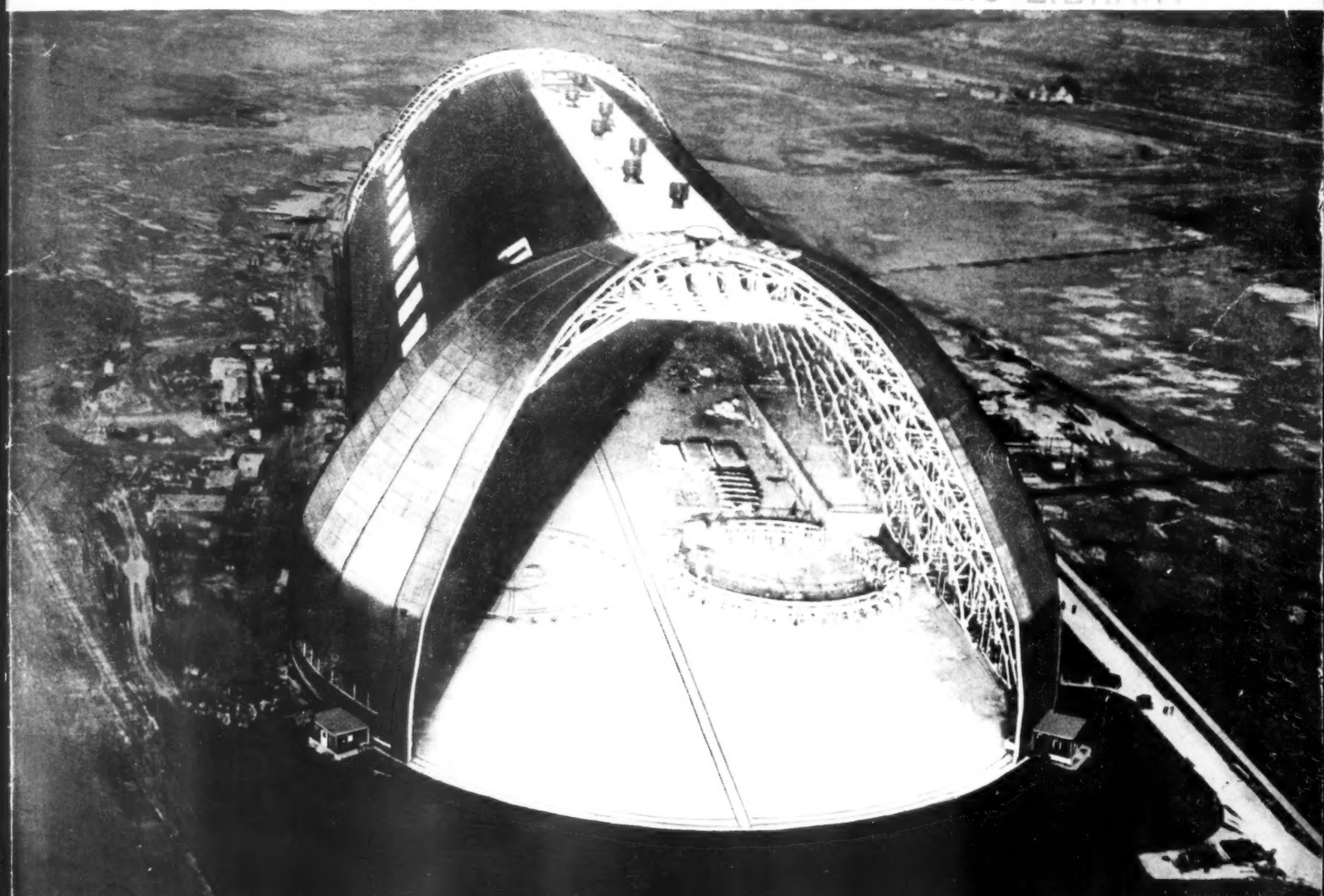

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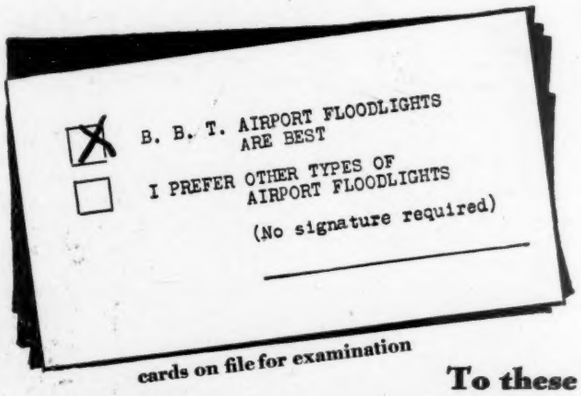

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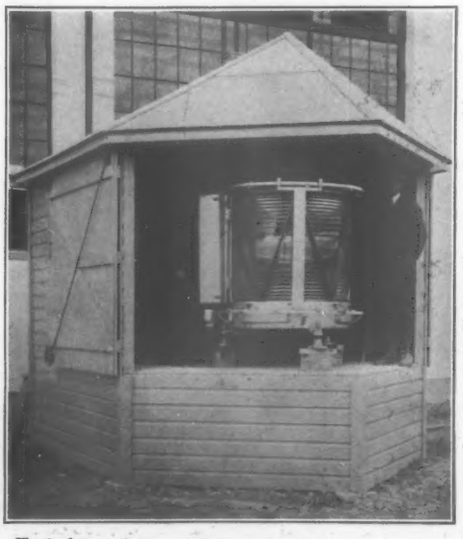

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AVIATION

The Oldest American Aeronautical Magazine

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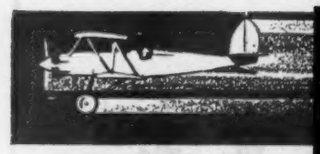

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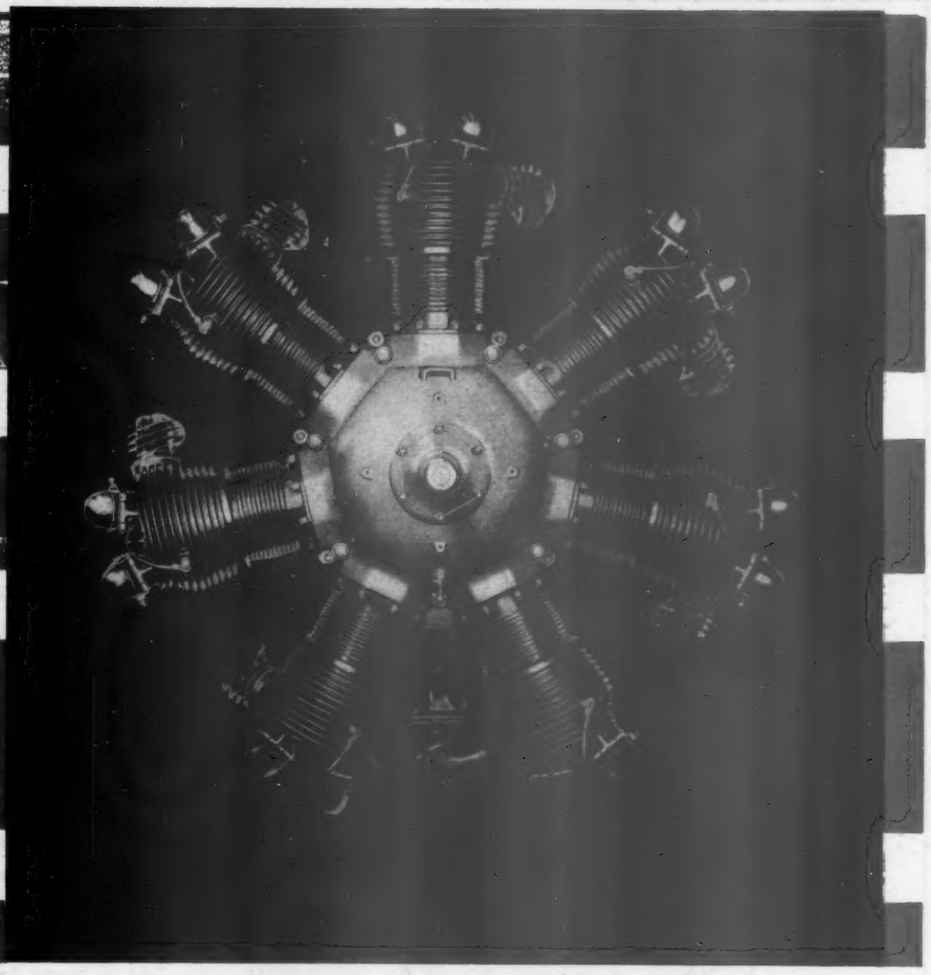

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THE OLDEST AMERICAN AERONAUTICAL MAGAZINE

A McGRAW-HILL PUBLICATION . . . ESTABLISHED 1916

EDWARD P. WARNER, *Editor*

VOLUME 28 . . . *February 22, 1930* . . . NUMBER 8

How Not to Handle Accident Publicity

SOME PEOPLE will never understand the psychology of the newspaperman. Because they have little or no respect for him, they think that he can be frightened or cajoled into keeping a story out of print. They do not seem to realize that he is extremely loyal. He is loyal to his paper. It may be a "sheet" of the most doubtful journalistic standing, and he may know it,—but he will do almost anything short of murder for that paper. So far as violating a confidence is concerned, a newspaperman would rather go to jail first. That has been demonstrated in some of the recent prohibition investigations. He is proud. He thinks his calling is of the highest.

He is a rather curious combination, the newspaperman, but withal he is human. Make a friend of him, and you have a real friend. "Play ball" with him, as he himself is likely to phrase it, fairly and squarely, and he will play the same sort of ball with you. But to cross him, threaten him, or try to buy him off is asking for trouble. He will work ten times as hard to get a story if an attempt is made to thwart him. This is not wholly resentment. The affair becomes a battle of wits, with an assurance of tremendous satisfaction if he succeeds in winning. Resentment, of course, does play a large part. It is resentment that will cause a newspaperman to delve farther into a story than he would ordinarily; but the resentment is less personal than it is a reaction of what he considers an affront to his paper, the dignity of which he places far above his own.

There is a certain individual in Kansas City who now knows a great deal more about newspapermen and their reactions than he did formerly. It may help him in his dealings with them in the future. One of the planes operated by his company crashed and the pilot and four passengers were killed. Instead of attempting to aid the newspapermen by supplying them with all the information that was available, he tried in effect to hush up the whole affair. He is said to have sent a crew of pilots and mechanics to the scene of the crash with instructions to allow no photographs to be taken, and to destroy what was left of the plane so as to entirely remove all evidence of what had happened.

Although he probably thought he was helping aviation, the press dispatches would indicate that he did not use his head.

His fatal error was in not allowing the newspaper photographers to take pictures of the wrecked plane and in threats made to break the cameras and even, it was reported by the local papers, to kill the photographers.

The result was that The Kansas City *Times* devoted to the crash practically all of the front page and a large portion of the second and third. There was the actual story of eye witnesses as related to the reporters; much dwelling on the threats alleged to have been made to them; a description of how the wreckage was removed within an hour after the crash occurred; accounts of the various theories advanced concerning its cause; a report of the coroner's plans for an investigation; a yarn telling of a premonition of the tragedy by the wife of one of the victims; a biography of the husband; an interview with a man who took the first instead of the ill-fated second section; a "sob story" about the wife of the pilot; even reference to a passenger whose life was saved by his leaving the plane at Topeka.

Conceding that the crash was bigger news for the Kansas City papers than for dailies elsewhere, even in Kansas City it would not have received such widespread publicity had not an attempt been made to destroy the evidence and to keep the newspapermen away. Nor would the accident have been played up as much in other cities. The events following the

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tragedy constituted news. It is safe to assume that practically every story on the crash that appeared in the *Times* was broadcast to the papers throughout the country by the news service representatives in Kansas City. The attitude which the air line official is reported to have adopted was the worst possible. It was a bonehead play.

Those in the industry must learn to face the music. They must learn that a serious crash cannot be kept out of print any more than a railroad wreck or the loss of a ship at sea. It is news and must be handled as news. If this executive had made a practice of calling the Kansas City newspapers and the press services whenever there was news, and had always given the reporters correct information; if he had made friends with the aviation writers, he would have found them coming to him not only to obtain information but to give it. If he had tipped off the papers when the crash occurred, had told them all he knew about it, and had allowed the photographers to take as many pictures as they wanted, the editors would not have raised the stir that was made.

If those in the aircraft industry learn from a bitter experience that it is better to co-operate with the newspapermen in every instance, and not just when favorable publicity is desired, perhaps the lesson has been worth while. The newspapers will benefit by more accurate information, and the air lines by the friendliness of the papers.

//

Contact Engineering

DESPITE the sombre touches imparted to the aeronautical panaroma of the moment by certain factors which center about selling, and to which there has been frequent allusion in these pages, there is among others one bright spot of color, also identified with selling, which refuses to be subdued. This is the unaffected enthusiasm of those who still unabatingly strive to sell products to the airplane manufacturer. The stream of salesmen, sales engineers, and even executives of manufacturing concerns in non-aeronautical activities who flock to the airplane manufacturer with hopes of selling him something for use in his planes is unstaunched. This is indeed a healthy sign, indicating as it does the faith of these manufacturing organizations in the continued successful business future of aviation.

With the misguided ambitions of the salesman who has a product which he confidently hopes the airplane manufacturer will find useful, and upon which his chief sales point is his ability to supply infinite quantities, we have scant sympathy. The representative who has a trick tire tape, of whose possibilities in aviation he hasn't the remotest idea, but who is optimistic enough to expect the airplane manufacturer to find a profitable application for him, deserves no more than the courteous dismissal he receives.

There is, however, a far larger group of those who represent reputable manufacturing concerns, with adequate engineering staffs, who also are anxious to enter the aeronautical field or to expand their present participation. There lies a splendid opportunity for the airplane manufacturer to reap a real benefit from cooperative contacts. These men deserve real consideration, for from them will come much of the technical refinement the industry vigorously requires at this stage of its growth.

Merely to acquaint them with the facts on raw and finished materials now being used is only half doing the job on the part of the airplane manufacturer. The real opportunity for beneficial results of what we shall call contact engineering goes far deeper than this. The airplane manufacturer should not merely acquaint the prospective addition to the fast-growing list of specialty manufacturers with existing products available for a specific purpose, but should go back to basic principles and requirements. For example, a prospective fire extinguisher manufacturer should not only be told of existing types of extinguishers all of which possess definite limitations, but also of the basic factors desirable in an extinguishing medium, so that his engineering force may revert to fundamentals and perhaps evolve an entirely new chemical or medium for the purpose.

This may at times involve considerable effort and cooperative activity on the part of the airplane manufacturer, but it is only by presenting a clear analysis of basic and desirable characteristics that real contact engineering may be brought into play. The technical staffs of specialty manufacturers are a distinct asset to our industry, which should be painstakingly cultivated by clearly defining our fundamental needs when encouraging their participation in our interests.

//

Seaplane Bases

MARINE AIRCRAFT are making their way in the United States. After a prolonged period of almost complete extinction, they are creeping back into favor via the amphibion. If straight seaplanes are to regain a deserved popularity, and if it is to be feasible to carry on over-water flying without the added weight and resistance of an amphibion gear, there is work to be done by port authorities, yacht clubs, airport companies, and airport commissions of waterfront cities as well as by airplane builders.

It is not enough to design seaplanes of the highest quality, and to provide for their production and for distribution at reasonable prices. Quite as much as landplanes, they must have places between which to fly. Even more than landplanes, they depend upon the artificial preparation of a site in order that operations may

be conducted with any degree of satisfaction. Perfectly natural landing fields, where airplanes can be staked down in the open between their flights, are common in some parts of the world. Natural seaplane bases, really safe in all winds and weathers and permitting arrival and departure in complete independence of aid from the shore, are non-existent.

We have not lost sight of the great advantage of the seaplane, commonly summed up in the claim that "it flies over a continuous landing field." The knowledge that he need never be forced, by the rare event of sudden engine failure, to seek a tiny field and side-slip into it is very comforting to the pilot. On the other hand, as classic anecdote has it: "When you get down on the land, there you are, but when you get down on the sea, where are you?"

The landplane pilot, once on the ground, can always get out and walk to the nearest highway and telephone. The man in the seaplane is still on an unstable element. He has to get into harbor. He has either to find a runway, to pick up a mooring, or to drop anchor and make sure that it is holding on a good bottom. In either of the latter events he must find someone to come off with a boat and take him to shore. Then, unless conditions are exceptionally favorable, a watch ought to be kept to protect the plane from dragging anchor and from collisions, and, if it be lightly loaded, to ballast it in the event of a squall.

If such things are to be the subject of casual arrangement in each port where the amateur seaplanist arrives, he will have to be more than ordinarily enthusiastic to cling to the sport in spite of the annoyances. But there is no reason why they should be casual. They should be permanently provided for. The local airport should have its marine counterpart, where the seaplane can have expert care and where, if desired, it can be pulled or hoisted from the water.

The municipalities which have given direct recognition to the claims of the marine aircraft can, so far as we have been able to discover, be numbered on the fingers of one hand. Port commissions and harbor boards ignore the problem. Commercial interests have generally shown an almost equal indifference, although there has recently been marked improvement there, especially in the neighborhood of New York.

The seaplane today works under much the same handicaps that confronted the landplane eight years ago. With no need for emergency landing places, for nature has created a profusion of water area available for that purpose, they must none the less have prepared terminals. Without bases, there will be but few seaplanes. Without extended seaplane operations, there is but little incentive to provide ramps and shelters and shops,—but if they be provided, the seaplanes will soon be forthcoming. The display of a little commercial courage, and if necessary the formation of organizations strong enough to provide a co-ordinated chain of water flying facilities all the way along the Atlantic or Pacific coast, would furnish the key to a very real dilemma.

//

Little Ducks in Big Puddles

THOSE PERSONS who may now be pondering the advisability of entering the aircraft market with a new design, to be produced by an entirely new company, may profit a very great deal from a consideration of the present condition of the aviation industry where approximately 90 per cent of all production and sales are controlled by half a dozen large groups. Anyone venturing forth with a new company at this time is almost sure to be a very small duck in a puddle of exceedingly large proportions. Consider the past five years within the automotive industry, during which time no new automobiles have been successfully brought forth except by companies whose resources and backing could be numbered in tens of millions of dollars.

Aviation is at a stage of development, as an organized industry, which was long ago reached by the automobile builders. The problems involved in the design, production, and sale of a new vehicle demand the attention of a nationwide organization.

Not that the independent enterprise does not have its place, or is to be discouraged, for the very opposite is true. The place for the small enterprise in the aviation business is now more proporly in the field of more or less local ventures such as taxi-plane operations, field and service developments, the manufacture, and sale of equipment and accessories, and other activities which serve to fill out and strengthen the great body of the industry. The automobile has attained its universal application through the good offices of great chains of small garages, service stations, auto accessory stores, small dealers and service centers, and the like. Many of the leading executives of our great automobile manufacturing enterprises have come up from the ranks of small dealer establishments.

The big development in the aviation industry are no longer on the ground floor, and the rush to be in on the ground floor, and to get a manufacturing company started in one's own name, must soon subside. In its place we can only hope for the most widespread redirection of effort and of aeronautical financing into channels of field, flying, and service developments. Such activities, energetically pursued, offer the means of best advancing the whole industry and of bringing profits to the individuals concerned. By first promoting local aeronautical developments those who are ambitious to progress in the industry will have the opportunity of being big ducks in little puddles, and will with good management progress to keep pace with an expanded area of the body of water in which they swim.

BUILDING *Zeppelins* IN THE U

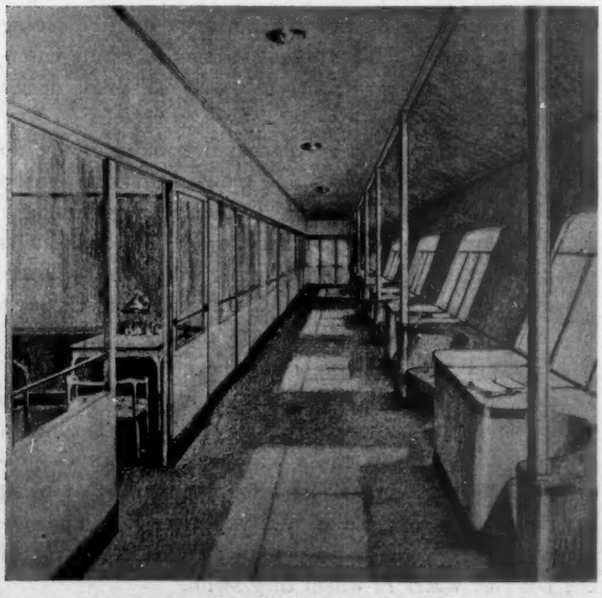
Some Interesting High Lights on the Construction of the ZRS-4 and ZRS-5

By WALTER E. BURTON

WHEN THE ZRS-4 takes to the air in 1931, the United States Navy will have the largest airship ever built. Soon after, the ZRS-5 will join its sister ship in the skies. Each of these Zeppelin-type dirigibles will have a lifting gas capacity of 6,500,000 cu.ft., making them 35 per cent larger than the British R-100 and R-101, about twice the size of the Graf Zeppelin, and almost two and one-half times as large as the Los Angeles, the only Zeppelin operating in this hemisphere.

Work has been progressing for many months on parts for the ZRS-4. On Dec. 4, 1929, Rear Adm. William A. Moffett, chief of the Navy Bureau of Aeronautics, drove a gold rivet into the master ring girder, marking the official beginning of the frame-work assembly. The girder is 133 ft. in diameter, outside measurement, and 120 ft. inside, and its thickness is 10 ft. on the outside edge. The girder is made up of duralumin sections that form a 36-sided polygon. The two outer rings are connected by zig-zag girders to a single inner ring, producing a unit that has a triangular cross section. Other main girders of the ship will be of the same general shape, but of varying diameters. Those near the tail will have only 24 sides. Longitudinal girders will connect the corners of the ring members, and will run the entire length of the hull. Thus the framework will be built up in the accepted Zeppelin style, consisting of a series of metal rings joined together by longitudinal members. But the new ships will contain numerous improvements not found in previously constructed rigid airships.

A conception of the size of the new Zeppelins can be obtained by comparing them with existing ships, the Graf Zeppelin and the Los Angeles in Fig. 1.



An artist's conception of the "Click" of a passenger airship

THE NEW NAVY AIRSHIPS are being constructed in the airship factory and dock erected by the Goodyear-Zeppelin Corp. at the Akron, Ohio, municipal airport. The dock, costing $2,500,000, covers nearly nine acres of ground, and is the largest building in the world whose roof is unsupported by pillars. It can hold a ship of 10,000,000 cu.ft. capacity. Cost of the ZRS-4 and ZRS-5 totals $8,000,000.

Incidentally, the meaning of the letters and figures in the designations of these Zeppelins is interesting. The Z is a letter used by the Navy to indicate lighter-than-air craft. The R is for rigid, and the S is for scout. The number indicates the number of the ship's direct ancestors. Thus, the ZRS-4 is the fourth rigid airship scout.

Comparison of the figures in the table given above reveals that the new ships are only 9 ft. longer than the Graf Zeppelin, yet are almost twice as large in volume. This reflects the tendency of modern airship design which calls for a short, fat hull rather than the pencil-like ones that were produced in quantity during the World War. Comparison with the Graf Zeppelin is a little unfortunate, because the German ship was built to fit the only available large hangar, and engineers were not at liberty to produce a more nearly ideal structure.

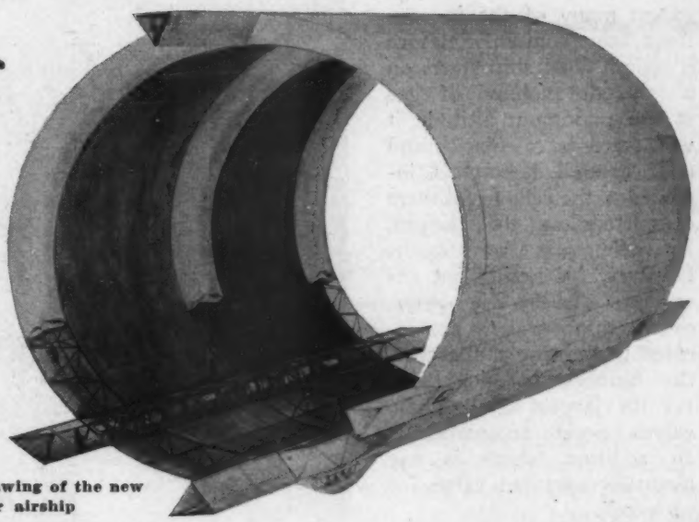
The aspect ratio of the Graf is 7.7, and of the American ships, 5.9. That is, the ZRS-4 and -5 will be about six times as long as they are wide.

The typical three-layer construction common to Zeppelin airships is followed in the American craft. There is a rigid metal framework sandwiched between an outer covering of doped and aluminized fabric, and an inner series of gas cells.

Main rings of the new ships are being spaced about

United States

and Equipment of



Cross section drawing of the new Goodyear airship

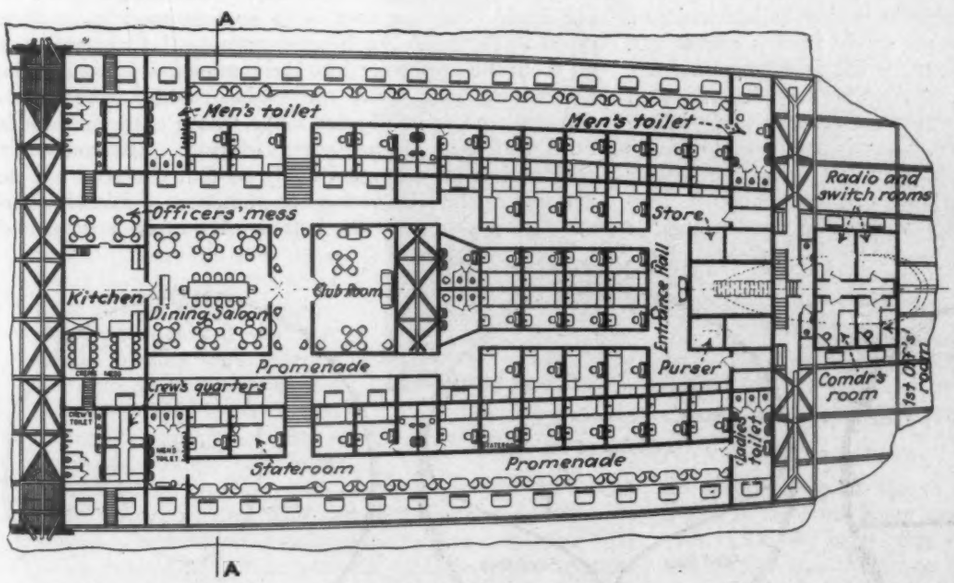
74 ft. apart, and the gas compartments are set between them. There are 12 gas cells arranged to form a bulkhead system similar to that used in surface ships. Two compartments can be completely deflated without destroying the buoyancy of the craft.

The main ring girders are of such construction that they are inherently strong enough to carry their loads without the use of cross wires. The triangular section makes it possible for members of the crew to climb inside them, entirely around the circumference of the ship, making inspections at all times during flight or rest. Between the main transverse rings are intermediate rings of single-girder type, usually three to a compartment. They serve merely to stiffen the hull, and carry no load.

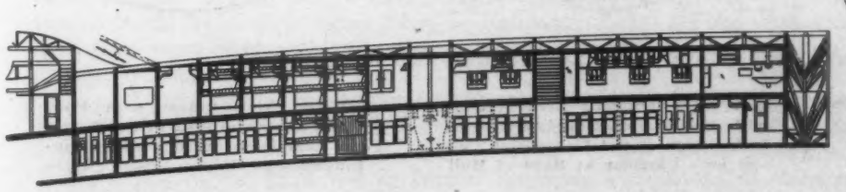
FOR MOST of the length of the ship there will extend three corridors, triangular in cross section. One is along the center top line of the hull, and the other two are each located up the sides, about 45 deg. from the vertical. This arrangement is a new development in dirigible practice, and is a departure from the former single-corridor arrangement.

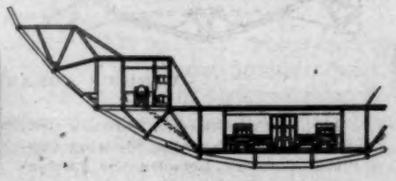
Rudders for controlling vertical and horizontal movements are located near the rear of the craft, arranged in pairs. They are manipulated by cables running from the control car, and by emergency helms in the lower fin. The control car is forward and projects downward below the streamline of the lower half of the hull. It is an integral part of the hull. It contains the latest known devices for efficient navigation, and is only large enough to take care of navigational requirements. The radio cabin, officers' and crew's quarters, a large galley, mess rooms, toilets and the like are located above, within the hull and near the middle of the ship. Each sleeping room has four comfortable berths.

The new ships use helium gas, a feature



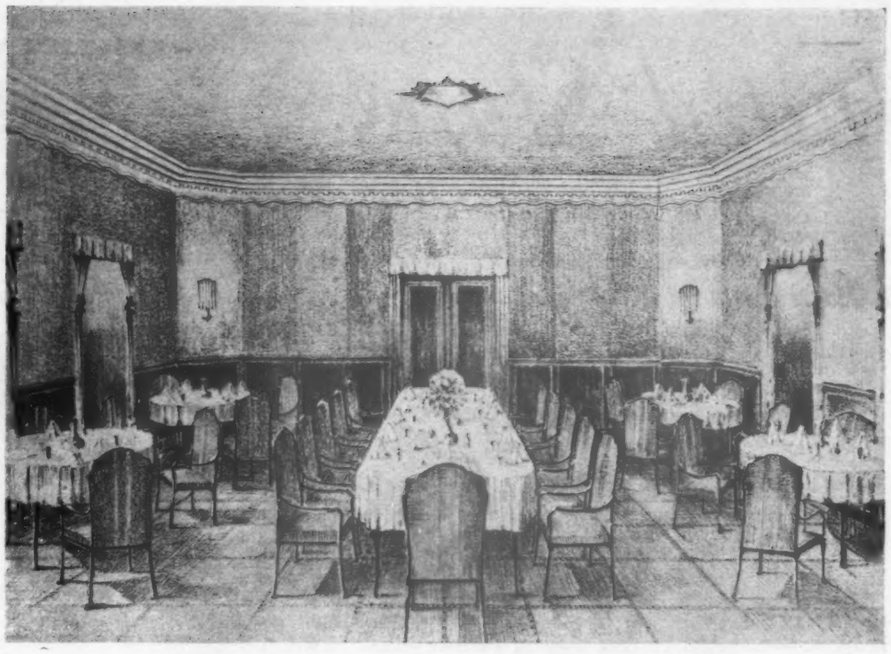
The proposed arrangement of passenger accommodations inside the hull of a hellum inflated airship





Section A-A

that makes possible to a large extent many of the innovations they contain. Before a helium-filled ship starts on a trip, the volume of gas at the maximum altitude it will reach is calculated, and only enough helium is included in the cells to fill them completely at this height. Provisions are always made, however, for letting out excess gas. In the ZRS ships, over-pressure valves are located in the top of the cells, the number reaching four for the largest cell. These valves operate automatically. In addition, there is one manually operated valve for each cell.

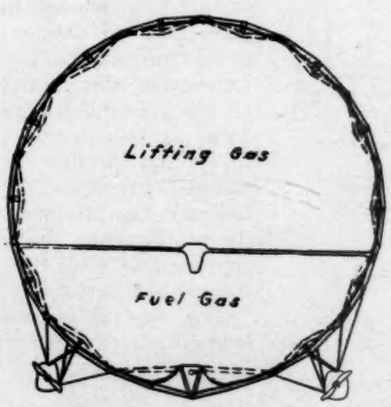


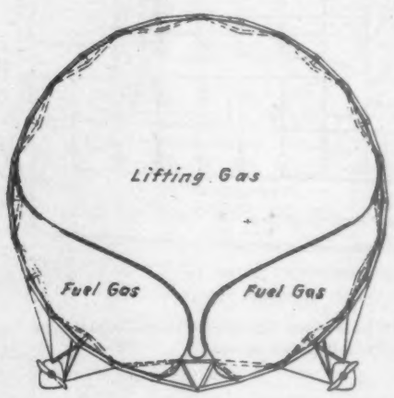
Drawing of the dining salon of the future passenger airship

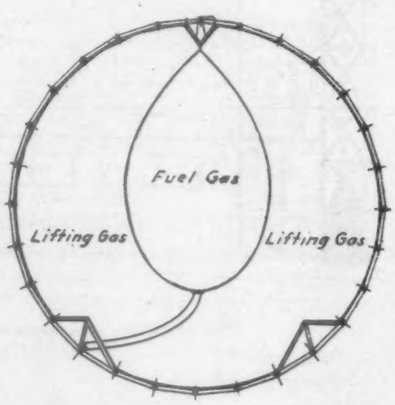
THE FACT that helium is non-inflammable permits the power cars to be built into the hull, rather than left dangling below, as in all past ships. This arrangement has numerous advantages, chief among them being a reduction of parasitic air resistance. Then the individual engine cars can be made more spacious. Power is transmitted through solid steel shafts and bevel gears to the propellers which are located outside the hull, on outriggers. Each propeller is rotable through 90 deg., and the engines are reversible. Therefore, the propellers can be made effective throughout a complete circle. This flexibility will prove valuable in saving ballast and gas, as a ship can land or take off safely against excess lift, and can descend slowly when the lift falls below normal.

Experience with the Los Angeles has demonstrated the feasibility of using a water recovery system. When gasoline or other fuel burns, water is one of the products of combustion. Since the oxygen that forms the heavier part of the water molecule comes from the air, it is possible to increase the ship's weight by condensing the water vapor present in exhaust gases. The Los Angeles installation makes use of a system of tubes placed between the engine cars and hull. This, however, offers considerable parasitic resistance.

The water recovery system on the new ships is designed to provide a maximum of cooling effect with a minimum of air resistance. Hot engine gases are run through a pre-cooler that reduces their temperature 80 per cent. The air used as a cooling medium is then piped to the cabin for heating purposes. Exhaust gases go from the pre-cooler into the condensers located in the side of the hull, above the engine rooms. These condensers are essentially flat tanks whose outer surface is flush with that of the fabric covering. The condenser surface is ribbed longitudinally so that the area will be maximum and the resistance minimum. Water separators are located in the bottom of the condensers, and







VARIOUS ARRANGEMENTS OF AIRSHIP LIFTING-GAS AND FUEL-GAS CELLS

Fig. 1: Cross-Section Through Cells of the Graf Zeppelin, Showing Central Corridor Between the Lifting-Gas and Fuel-Gas Cells of the Ship

Fig. 2: Alternative Arrangement, with Fuel Gas-Cells Below and on Either Side of the Lifting-Gas Cell and with Corridor at Base of Hull

Fig. 3: Arrangement with Fuel-Gas Cells Suspended in the Center and Completely Surrounded by Non-Inflammable Helium-Gas Cells

the recovered water is carried by pipes to ballast bags along the side gangways.

Perhaps the most picturesque feature of the new ships will be their airplane compartments. At about one-third the ship's length from the front is a compartment 75 ft. long and 60 ft. wide. In this, five completely assembled airplanes can be kept. At the bottom is a T-shaped opening normally closed by collapsible doors. When it is desired to launch a plane, it is attached to a trapeze and lowered through the opening. The engine is then started and warmed up, and the plane disengages itself from the trapeze and continues flight. When the airplane returns, it hovers below the trapeze until the supporting hooks are engaged, and is then drawn back up into the "hangar." This feature, of great military value, could be of considerable commercial use as well.

Safety has been a primary factor in the design of the American Zeppelin. The Shenandoah disaster taught lighter-than-air engineers many things. Therefore, the hull strength of the new ships is such that they can enter, at full speed, a sharply-defined vertical current of 60 ft. per sec. velocity, a more severe condition than any ever encountered in actual flight. The ship can withstand violent movements of the rudders, either alone or in combination, and can fly at excessive angles of pitch.

Fig. 1: Comparison of the Los Angeles, the Graf Zeppelin and the ZRS-4

Name	Los Angeles	Graf Zeppelin	ZRS-4
Nominal gas vol., cu.ft.	2,470,000	3,700,000	6,500,000
Length overall, ft.	658.3	776	785
Maximum diameter, ft.	90.7	100	132.9
Overall height, ft.	104.4	113	146.5
Gross lift, lb.	153,000	258,000	403,000
Useful lift, lb.	60,000	.....	182,000
Number of engines	5	5	8
Total horsepower	2,000	2,750	4,480
Maximum speed, m.p.h.	73.1	80	83.8
Range without refueling at 50 knots (57 m.p.h.) cruising speed, land miles	4,000	6,125	10,580

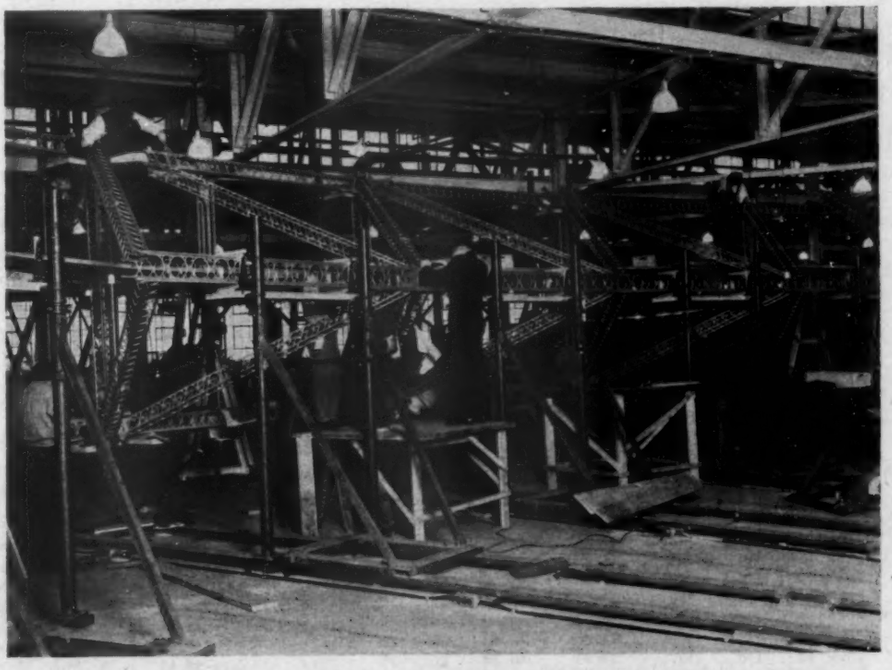
THE ZEPPELIN characteristic of multiple gas cells adds to the safety factor. Likewise, the multi-engined power system permits the craft to navigate with several of the power units out of commission. This advantage was demonstrated by the Graf Zeppelin when it returned to safety with all but one of its engines stopped, the four having gone out of commission soon after a trans-Atlantic trip had been started.

Although helium reduces the fire risk tremendously, every precaution has been taken to safeguard the ships from flames. Past experience has indicated that fire usually results only when a fuel tank is ruptured, as in a collision. This is considered a remote possibility in a Zeppelin, today at least. However, the engine rooms of the new ships have been made fireproof, and elaborate fire-fighting systems installed. Ventilation is adequate, so that explosive fuel vapor cannot collect in pockets. All electrical connections are gas-tight.

Lightning, contrary to general opinion, is not considered a real danger. There have been recorded only two instances of airships being fired by lightning, and both ships were filled with hydrogen. A direct hit will damage the hull only locally, and to a small degree, because of the well-bonded construction. The entire framework acts as a huge Faraday cage, effectively dissipating a lightning charge.

The safety of the ships will be further improved by the accessibility of all their parts at all times. Periodic inspection will make for avoidance of trouble.

THE DESIGN of the two Navy airships is such that it can be easily modified for producting a commercial airship capable of carrying mail and passengers over long routes. The helium-filled ship with its component parts nearly all located inside the hull makes possible a far more comfortable passenger Zeppelin than any hitherto produced. The Graf Zeppelin is admittedly superior to its predecessors as far as passenger comfort goes, but it still is far from being perfect, on long trips especially.



Assembling a section of the first ring girder for the ZRS-4

A 6,500,000 cu.ft. ship of the general dimensions of the ZRS-4 and -5 can be built to carry up to 100 passengers comfortably, the number being determined by the amount of fuel taken along. Such a ship provides the following accommodations:

Total deck area of 12,000 sq.ft., of which each stateroom uses more than 70 sq.ft. and accommodates two persons; corridors and promenade decks totaling 900 ft. in length and having an average width of 5 ft.; public compartments occupying 3,500 sq.ft. The ship provides further passenger comfort by means of lounges, dining salons, smoking rooms and promenade decks.

THE STANDARDIZATION OF Airplane

S. A. E. Recommended Practice Tire Dimensions

From the report of the Aircraft Division, adopted by the Society June, 1929.

Wheel Size	Rim Dimensions Width between Flanges	Rim Dimensions Ledge Diameter	Standard Tire Size	Oversize Tire for Extra Cushioning	Actual Tire Dimensions, Plain Tread Tire Section Width Min.	Tire Section Width Max.	Tire Over-all Height Min.	Tire Over-all Height Max.
10× 3	2½	4	10× 3		3.12	3.18	10.24	10.36
14× 3	2½DC	8	14×.3		3.12	3.18	14.24	14.36
				16× 4	3.96	4.04	15.90	16.06
18× 3	2½DC	12	18× 3		3.12	3.18	18.24	18.36
				20× 4	3.96	4.04	19.90	20.06
24× 4	2½DC	16	24× 4		3.96	4.04	23.90	24.06
				26× 5	4.83	4.93	25.56	25.76
28× 4	2½DC	20	28× 4		3.96	4.04	27.90	28.06
				30× 5	4.83	4.93	29.54	29.74
30× 5	3 DC	20	30× 5		5.00	5.10	29.56	29.76
				32× 6	5.83	5.95	31.31	31.53
32× 6	4 DC	20	32× 6		6.17	6.29	31.33	31.55
				36× 8	7.78	7.94	34.88	35.18
36× 8	5 DC	20	36× 8		8.12	8.28	34.91	35.21
				40×10	9.74	9.95	37.99	38.35
44×10	6 DC	24	44×10		10.07	10.28	42.04	42.40
54×12	7 DC	30	54×12		12.00	12.26	51.63	52.07
				58×14	14.22	14.50	55.26	55.78

THE TITLE obviously connotes standardization of tires, which is equally important. What then does such standardization mean, if properly done? In commercial work it may mean the difference between profit and loss on the enterprise, and in military, the difference between winning and losing a campaign.

For both civil and military work, simplification of equipment is vital to success, but how does standization attain that end? To quote the classic example of the results of no standardization, the American tire companies were making 48 sizes of balloon passenger tires during the first two years of the change over from the high-pressure type. Now the industry has standardized and the total range of sizes is 18. One is privately of the opinion that this number might be further reduced if it were not for the vested interests of some very large car producers. The U. S. Air Services have standardized five sizes of tires for their needs and these five sizes use only four axle sizes! In the same range, the Palmer Tire Company in England lists nine standard tire sizes, and 38 axle diameter and length combinations.

The S. A. E. standard wheel and tire sizes show 16 sizes of tires, from 10 x 3 to 58 x 14, with 8 axle combinations. Palmer in the same range, i.e., from 12 x 2½ to 60 x 12, lists 19 tire sizes and 68 axle combinations! It is true that a number of these are simply different lengths for a given axle diameter.

In the United States there is only one type of tire used, that being the drop center, while in England there

Standard Sizes of Landing Wheels and Tires in England

Tire Size mm.	Wheel No.	Hub Length mm.	Hub Bore mm.	Track Line mm.
375× 55	168	111.12	25.4	Central
375× 55	195	130.	38.09	Central
300× 60	16	111.12	25.4	Central
450× 60	30	89.	31.75	Central
450× 60	172	130.	38.09	Central
575× 60	21	160.	28.0	Central
575× 60	180	150.	38.09	104/46
575× 60	186	120.	34.92	Central
575× 60	190	150.	38.09	Central
600× 75	21	160.	28.0	Central
600× 75	180	150.	38.09	104/46
600× 75	186	120.	34.92	Central
600× 75	190	150.	38.09	Central
700× 75	78	178.	44.45	132/46
700× 75	79	178.	44.45	Central
700× 75	100	178.	38.09	132/46
700× 75	101	178.	31.75	132/46
700× 75	196	178.	55.00	Central
600×100	188	120.	34.92	Central
600×100	304	150.	38.09	104/46
600×100	333	120.	34.92	Central
700×100	77	178.	44.45	132/46
700×100	92	185.	55.00	135/50
700×100	95	185.	55.00	Central
700×100	99	178.	38.89	132/46
700×100	112	150.	38.89	Central
700×100	176	178.	44.45	Central
700×100	179	178.	55.00	132/46
650×125	119	178.	55.00	132/46
650×125	147	178.	55.00	Central
650×125	188	120.	34.92	Central
650×125	336	178.	44.45	132/46
750×125	77	178.	44.45	132/46
750×125	92	185.	55.00	135/50
750×125	95	185.	55.00	Central
750×125	99	178.	38.89	132/46
750×125	112	150.	38.09	Central
750×125	176	178.	44.45	Central
750×125	179	178.	55.00	132/46
800×150	161*	185.	55.00	135/50
800×150	162*	185.	55.00	Central
800×150	163*	185.	66.67	135/50
800×150	169†	185.	55.00	135/50
800×150	177	185.	55.00	135/50
800×150	183	185.	55.00	Central
800×150	211*	185.	60.32	135/50
1,000×150	167	185.	55.00	125/60
1,000×150	174	250.	80.00	Central
1,000×150	182	185.	55.00	Central
1,000×150	187	220.	66.67	Central
1,000×150	201	185.	60.32	125/60
1,000×150	210	185.	60.32	Central
1,000×180	148	220.	80.	Central
1,000×180	149	185.	55.	Central
1,000×180	155	220.	66.67	Central
1,000×180	166	185.	55.	125/60
900×200	107	185.	55.	Central
900×200	108	185.	55.	125/60
900×200	128	220.	66.67	Central
900×200	137	250.	80.	Central
900×200	157	185.	80.	Central
900×200	202	185.	60.32	Central
1,100×220	134	220.	66.67	Central
1,100×220	136	250.	80.	Central
975×225	192	185.	60.32	Central
975×225	194	185.	55.	125/60
1,100×250	364	220.	60.32	Central
1,250×250	314	250.	80.	Central
1,250×250	154	304.8	101.6	Central
1,500×300	305	304.8	152.4	Central
1,500×300	306	304.8	101.6	Central
1,525×325	197	304.8	101.6	Central
1,750×300	139	400.	152.4	Central
1,750×300	191	350.	150.3	Central
1,750×350	193	400.	125.	Central
2,000×450	363	500.	152.4	Central

*Wheels Nos. 161, 162, 163 and 211 are of stronger type than the other wheels for 800×150 tires. †Wheel No. 169 is fitted with Ball Bearings. Grease gun equipment is now a standard fitting on all wheels. (A/NL)

By JOHN R. CAUTLEY

Wheels

There is, perhaps, no member of the American aeronautic industry better qualified to write on the ever important subject of airplane wheel and tire standardization than Mr. Cautley who now holds the position as engineer with the Bendix Brake Company. For a number of years Mr. Cautley has been a most active member of the committee of the Society of Automotive Engineers in charge of wheel and tire standardization. He is also thoroughly familiar with standardization developments in the military services, and what he has to relate should be of considerable interest to all members of the industry

are two, the drop center and the clincher, which are not interchangeable on the wheels.

It may seem hardly necessary to argue the case, but for the sake of clarity consider what one new wheel and tire, with the necessary oversize, means:

1. It means that at least three wheel companies must make tools, produce a stock and provide supplies for service all over the U. S. and in Canada. In addition, if the new wheel is for military purposes also, spares must be sent as far as the Philippines.
2. At least four tire companies must make molds, then tires, and finally distribute four sets of stocks at least over Continental North America!

It would seem, therefore, that the case for simplification is proved if the standards are correct and provide a range of sizes which will not handicap the designer by necessitating a larger wheel or axle than he needs.

In this country it is believed that the present range of standards covers the designer's needs with small enough steps for all practical purposes.

In the presentation of the case for rational standardization, it could not be made complete without a concrete example. In the case of wheels and tires the standards developed quite naturally, if not quite logically, from the needs of military aircraft.

IN 1926 the only standards in existence were the U.S.A.C. specifications for wheels without brakes and the complementary A.N. specifications, which were the same. These were dictated by military requirements and developed from experience with wire wheels. The sizes covered the military range and were from 30x5 to 54x12. Even at that time, the Air Corps had proved that the straight side tire was superior to the clincher, and thus removed one problem of standardization.

In 1927 the commercial airplane industry began to make itself felt. There were no standards save the military. Commercial makers began using the military standards with deviations due to surplus war stock, and the tire companies in addition received requests for quotations on 28 sizes of tires smaller than 30x5.

During that year the Tire and Rim Association, which represents all the tire, rim and wheel manufacturers, formed an active committee to try to lay out a reasonable range of tires and wheels. At the same time, a similar committee of the S.A.E. became more active. This committee had members on the Tire and Rim committee and that made co-operation easy. The Army-Navy standards committee was invited to join in the work, and did so. In general, the military and civilian requirements were found to be fundamentally the same. Airplane manufacturers showed a willingness to come into line, and as a result the S.A.E. recommended practices for airplane wheels cover tire sizes, oversizes, inflation pressures for loads up to maximum, and standard valves for all tires. The minimum required static radial and side load strengths were set up for wheels, as well as rim profiles, and developed from a definite set of reasons. Finally, wheel, hub and axle dimensions were set up for a complete range of wheels for both plain and anti-friction bearings. Thus in two years it has been possible to bring about a complete set of recommended practices which combine military and civilian requirements.

No one knew copletely what was required! Everyone knew that a trail was better than no road at all. It is believed that a good blazed trail has been made. It may be followed by a standards road, but it will also be necessary to blaze another trail to keep the low pressure scouts from making a myriad of paths through the woods, on which the engineers will become hopelessly lost.

THE PRESENT recommended practices come after ten years' experience with the general type of tire, now most frequently used. No one has had any real experience with low-pressure tires. But, they have their place, and they may easily supersede the present tires, as the balloon did the high pressure in the automobile.

However, it must be remembered that the automobile balloon of today is not the balloon as it was originally introduced,—not by 20 lb. pressure and two to four plys of fabric in the casing. It is much the same with the low-pressure tire.

The "Balloonatic tire" should not be used to supersede all others, for it can not. It should be used as a basis for a tire which will give the maximum of advantages inherent to low pressure with a minimum of the many drawbacks.

As another evidence of the value of standardization in the right manner and ahead of production, attention is drawn to the recommended practice of the S.A.E. for roller-bearing wheels. This recommended practice, while not entirely in advance of the use of roller-bearing wheels on airplanes, is largely ahead of real production.

Roller-bearing wheels without brakes are futile, but roller-bearing wheels with brakes are of great value, as they not only reduce the length of take-off by an appreciable percentage, but they increase the ease of handling of the plane on the ground to an enormous degree. In addition, they require an accuracy in axle, wheel and brake which results in an operating mechanism which can be adjusted closely and will consequently be powerful and slow to wear.

That recommended practice is the result of over two and a half years of argument and compromise between the wheel makers and the bearing makers. Until this recommended practice was evolved, there were no bearings made light enough to be satisfactory for this job. Now the aeronautical industry has available a series of what it is hoped will be standardized bearings, produced by more than one manufacturer, for the specific purpose for which they are used.

This purpose may be summarized by stating that these bearings are designed to operate satisfactorily under a maximum crushing load with a minimum of weight in the bearings, and a minimum of diameter. The wear factor, which is so large a proportion of the weight of the normal anti-friction bearing, has been cut to a minimum, as the hours of use of an airplane wheel during the life of a plane are but a small fraction. An actual saving in wheel weight of nearly 12 per cent has resulted from this special study.

This recommended practice for roller-bearing wheels may not be, and probably is not, the last word, but it represents again a start along definite lines which will reduce the cost of development enormously because it will at least direct efforts along a reasonably logical path. It should be brought out that the revised rim sections which were approved by the tire people, as well as everyone else are based on a definite and logical procedure. It has been found in practice that tires can be made to operate satisfactorily on rims having a ledge width of 50 per cent of the normal section of the tire. Based on this assumption, all wheels have been designed with rim widths that allow one oversize beyond the standard; that is to say, a 30x5 wheel will operate satisfactorily with a 32x6 tire but will not be guaranteed to operate satisfactorily with a 36x8 tire.

ONE OF the most difficult things to standardize is the maximum load allowable on a given size of wheel. It is believed that wheels should be designed for the normal size of tire to be mounted upon them. This allows one oversize to take care of soft landing fields or even abnormal loading for special purposes. Also, as a last resort, it provides for the case where the designer's estimate has been optimistic and the plane in production is somewhat overweight and needs oversize tires as original equipment. That is an emergency measure, however, and *must* be corrected as soon as possible, even at the cost of scrapping some axle tubing. It is sometimes argued that a wheel should be built strong enough to handle the full load allowable on the oversize tire.

That is fallacious for two reasons. First, because if a wheel were so strengthened, designers would attempt to use it as standard equipment *with* the oversize tire. Then users in special cases would attempt to double oversize, which would not be satisfactory. As an example: There might be a plane built to weigh 3,000 lb. gross. Such a plane requires 30x5 tires. If the 28x4 wheel were built to handle a 1,600 lb. load, the designer would use 30x5 tires on the 28x4 wheel. *But*—this wheel would not mount 32x6 tires satisfactorily and for many conditions this tire might be needed. Second, because of the strengthening of the wheel, the weight would increase. So would the brake size, as increased brake power would be required to meet the weight carrying ability. The net result would be little saving in weight and a wheel which would not mount an oversize tire.

IN ORDER to promote rather than retard development, studies are already being made of wheels beyond the large end of the scale, with a view to determining what the next larger size or sizes should be.

At the present moment, the so-called "doughnut" tire or "air wheel," which might almost be called the "balloonatic" tire, is creating a tremendous amount of interest among pilots and some among engineers. It would appear that this type of tire has some very great advantages, especially for tail wheels where minimum diameter for maximum power of sustension is of vital importance.

This type of tire presents the next major standardization project. Is it going to be used in its extreme form as now presented by at least one company, or is it going to be modified as has been the case with most innovations? The main thing is to see that there is an intelligent collection and summing up of the elements so that a new standard, for it will surely have to be, is evolved for axle diameters, axle wall thicknesses, hub lengths, etc. And that these new standards, when they are developed, bear a reasonable relation to the present standards for wheels now in use.

No designer with a real need, which he can support with a logical engineering argument, need feel that he cannot persuade the wheel and tire manufacturers to modify or extend existing standards.

A standard, in the American automotive industry, of which airplanes are a part, is a tool to be worked with or discarded, not an idol to be made sacred and worshipped without logic or thought.

Putting it another way, American standards are a target to be shot at and to be removed if they can be filled full of holes. Standards are set up for the economic advantage of an industry and unless they can prove their worth, they should be and are, discarded.

In the basic sciences such as physics, basic laws or standards are set up and last usually a long time, until later research proves the necessity for modification. In industry, especially the newer ones such as aeronautics, standards are set up as signposts of the direction of economic manufacture and maintenance. Absolute individualism is as dangerous in industry as it is in government. On the other hand, slavish conformity and fear of change are even worse.

The automobile industry in America has proved the value of fluid standards actively administered and watched over. It has proved equally clearly the fact that if standards are set up which are ill advised, or ahead of their time, they will not be used. Cancellation of poor standards is as important as the framing of proper ones. Fluidity of the standards system in a new art is vital and if they are so regarded, they are a most important part of the economic structure, leading to reductions in costs, which are vital to success. If they are kept static as in the case of less happily situated government agencies than those for air, they are a handicap which is sometimes almost fatal.

Let us standardize in a fluid manner and advance; not in a solid manner and ossify. Let us truly standardize and progress.

OPERATIONS OF THE NAVY'S Safest Squadron

An Account of the Flying Activities of the Unit Which Won the Schiff Memorial Trophy for 1929 With a Record of 8159 Hr. 35 Min. in the Air and Only Three Minor Accidents

By LIEUT. COMDR. WILLIAM MASEK
Operations Officer, Naval Air Station, San Diego, Calif.

WHEN the trophy committee, governing the award of the Herbert Schiff memorial trophy, made the announcement in 1928, that it had decided to discontinue the annual award to the naval aviator who flies the greatest number of hours without accident, and in the future would award the trophy to the squadron or unit making the best record for safety during the year, officers in charge of training squadron VN-7-D-11 at the Naval Air Station, San Diego, Calif., decided to compete. During the year following, planes of the squadron made 7670 flights for a total of 571,130 miles in 8159.35 hr. with only three minor accidents.

Operations of the squadron have been conducted under the leadership of Lieut. T. G. Fisher, squadron commander, in a manner always looking forward to the utmost safety for pilots and students, both in the air and on the ground. It is difficult to over-emphasize the extreme care necessary in conducting operations of any training unit, whether it be in military or civil service. It is possibly more risky than any form of flying because here you have untrained pilots at the controls during many hours.

Six factors guiding both the policy and conduct of the squadron have enabled us to attain the record which proved sufficient to win the Schiff trophy. They are as follows:

1—No person, either officer or enlisted man, not physically qualified is accepted for instruction.

2—Careful and routine inspection of all planes and engines insures highest performance.

3—Careful supervision of flying insures obedience to commands.

4—Obedience in observation of air rules and regulations helps insure safety both in the air and on the ground.

5—Thorough indoctrination in all existing air rules, both local and general, avoid any excuse of ignorance on the part of students.

6—Careful analyses and study of the causes of previous accidents enable us to avoid future accidents.

IN THE SQUADRON are accepted both officer and enlisted student aviators. The course is not designed to make aviators but only to test candidates and recommend those successful for further training at Pensacola. Both the officers and enlisted men undergo practically the same training. Each student, with the exception of his first two flights (each of 45 minutes which are intended only to familiarize him with the NY training plane and the functions of controls) flies one hour daily with his instructor.

At the end of the student's fifteenth hour the instructor either approves him for further training or reports him unfitted. Here a double check system gives the student an excellent opportunity to demonstrate whether or not his instructor's report is correct. Each student has two out of three opportunities to prove his ability and adaptability. If either his instructor or the chief instructor reports him unfitted, a third officer takes him up for a check flight and the third vote is final. Under certain exceptional cases the student may be given additional hours of instruction. Those who pass the check, solo for two hours and then depart for their surface station or are assigned for further air training. We follow a chain instruction system with enlisted men, receiving nine each week from the Great Lakes and the San Diego Naval Training Station, with a total limit of 27 enlisted men receiving instruction at one time. Officers from the fleet come to us at intervals of five to six weeks in classes of 20.

Training for the fleet officers is voluntary. Graduates of the naval academy are required to undergo the course during their first year. Whether they go on for advance

training is their own decision. Any officer in naval aviation may be relieved and reassigned for duty with a surface unit on his request.

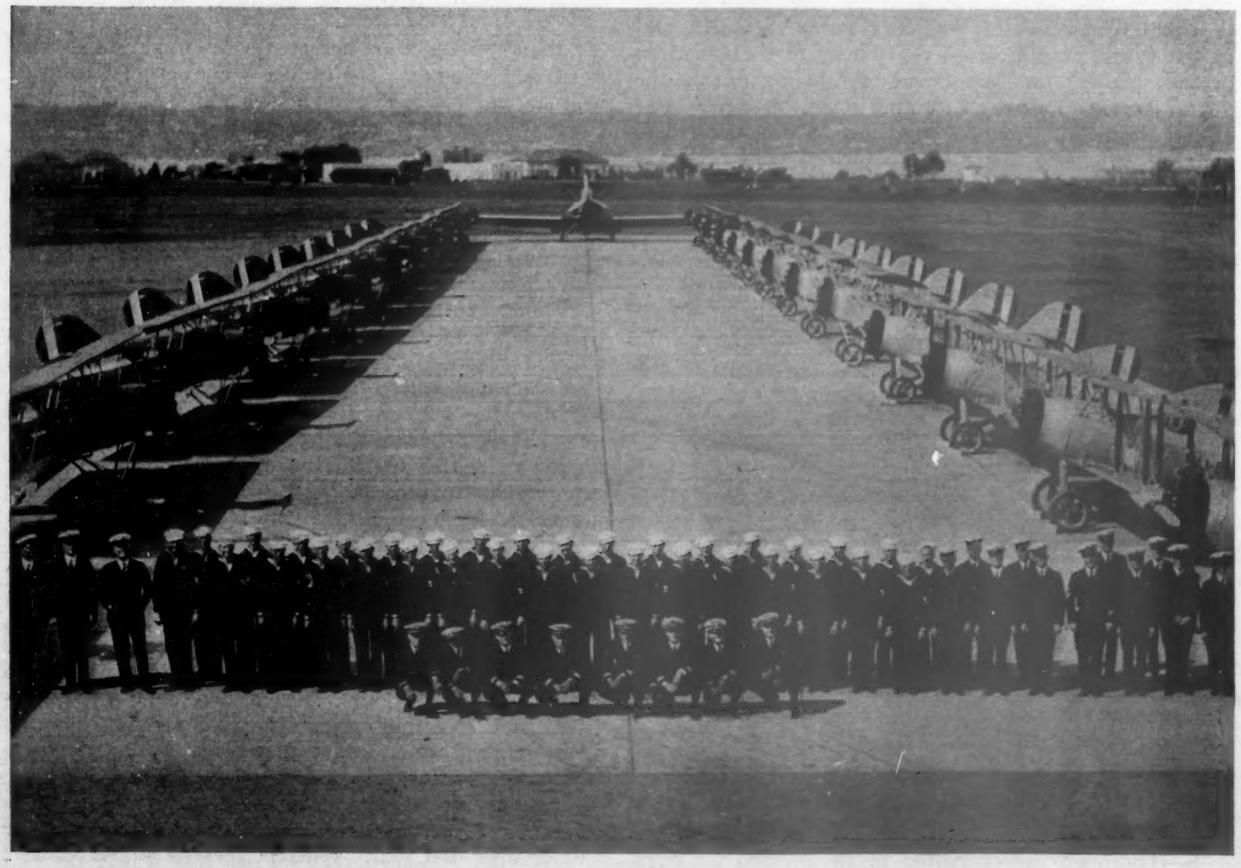
STUDENTS attached to the "Schiff Squadron," as it has been termed recently, operate from restricted areas under congested flying conditions. While the traffic lanes are well marked out and observed, and while the students carry on their training flights from Ream field, situated 10 miles from North Island, they encounter between the two points other planes from the Naval Air Station, Fleet Air, the Army Marine Corps, from Ryan Airport, from Lindbergh field and those flying along commercial lines between San Diego and Mexico. To date there have been no difficulties involved in this congested flying since no naval aviator or aviation pilot accepted at the Naval Air Station is permitted to make a flight until he has certified in writing that he has re-read the rules of the road for aircraft and the flight instructions published in the Bureau of Aeronautics manual, Naval Air Station flight rules governing local flights and special orders issued from time to time by the Bureau of Aeronautics restricting the flight operations of certain aircraft.

The flight instruction methods and routine followed in this squadron might well be applied to any civilian school. Each group of students hears first an address from the operations officer, then a talk by Capt. Frank R. McCrary, commanding officer of the Naval Air Station. Captain McCrary insists that each student exert his best efforts as a matter of pride and for his personal safety whether he continues flying or abandons aviation at the end of the course. Each student is told that no partiality will be shown but that he should feel no regret should he be not recommended for advanced training. Some individuals, it is explained to him, are not adapted to the exacting duties of an aviation pilot or naval aviator, just as some persons cannot become musicians.

During the Schiff competition each instructor flew approximately four hours each day devoting one hour to each student. The student began his flying immediately with no previous ground instruction. His indoctrination flying served adequately as a substitute. Both officers and enlisted men previously had had certain training generally denied civilian students. This, of course, makes ground instruction unnecessary in the Navy, where in civilian schools it may be important.

The instruction is designed to produce two results: safety in the air, and the weeding out of the unfit. Six officer pilots and 10 enlisted pilots give the instruction. All flying is done with 16 NY training planes powered with Wright J-5 engines, with eight planes in reserve. Stunting is not permitted. The spin is the only so-called stunt and this is undertaken only to give the student experience in recovering from this maneuver.

NATURALLY much of the success of the squadron has been due to the enlisted ground personnel who keep the planes and engines in shape for flying. One mechanic, known as a plane captain, and one assistant care for each plane. Before and after each flight these men check carefully all observable parts and reject any plane not fit for flying. Before each flight the pilot also examines the plane and accepts or rejects it. Immediately after each flight the pilot on landing reports to the officer in charge and enters on the flight inspection form over his signature a



The "Schiff Squadron," winner of the Schiff Memorial Trophy for 1929, on parade

Left to right: Capt. Frank R. McCrary, commanding officer, North Island Naval Air Station; Lieut. Comdr. William Masek, operations officer; Lieut. T. G. Fisher, commanding officer, "Schiff Squadron"

brief statement as to the condition and performance of the plane in flight.

Each week the planes undergo thorough inspection and the plane captains with their assistants break down all parts and conduct a top inspection of both engine and plane. It has been the squadron's policy to turn in planes and engines after approximately 400 hr. in the air. The engines go to overhaul earlier if they show any signs of weakness. Each engine not in daily use is turned over by hand at least one and a half revolutions every day and after the overhaul or a change of the power plant each plane is flown two hours in the immediate vicinity of the Naval Air Station. Reasons for that are obvious.

Throughout the country planes often are damaged by lack of care in running them in and out of hangars, by too rapid approach to slip ways or operation lines, and by the inexperience of pilots in maneuvering them on the ground. Wherever possible, one individual should supervise the running of planes in and out of hangars. We have followed this rule and it has avoided more than one potential crack up.

On flying fields as little ground maneuvering as possible should be done, and this very slowly. Our pilots always bear in mind the damage that may be caused by propeller blast to other planes in the rear of the operating line, and they taxi away slowly. The fact that the three accidents occurring to planes of our squadron during the year occurred on the ground demonstrates very well the advisability of pilots being on the lookout for other planes in the air and on the field an then proceeding as directly as possible to their take-off position, or in any other maneuver on the ground.

During our training of 478 students (of whom 157 were qualified for further training) the only damage to planes was as follows:

One plane suffered a badly bent center section strut, the leading edge of the lower left wing was cut six inches and the upper wing was strained. Another plane suffered a broken wheel and a bent propeller blade. During a collision between two planes of the squadron the left wing of one was damaged in the outboard section and the blade bent, while the other plane suffered damages to the left wings. In none of these cases was a pilot or student injured.

Award of the Schiff trophy to a squadron with a high safety record we believe to be of more value than such an award to an individual aviator. This permits enlargement of the competition. All flying done by our squadron was routine training work pointing toward a purpose other than winning the trophy. It is impossible that any individual pilot should continue year after year flying more than 1,000 hr. yearly in an effort to win the award. On the other hand squadron competition is of such a nature that individual pilots will not attempt to pile up hours in an attempt to capture the trophy.

To be eligible for the Schiff trophy each squadron or unit must fly a minimum of 1,000 hr. Each unit receives a penalty for every accident occurring during the competing year. The weight of the penalty varies in accordance with the degree of injury received by pilots and students and by the degree of damage received by material.

A handicap is assigned to various squadrons in order to equalize the difference in the duties they perform. Factors considered in working out the involved formula by which the winning squadron is determined, include the number of persons who received minor injuries, those who received serious injuries, those who received fatal injuries, the number of accidents which resulted in minor and easily replaced damage, those resulting in damage requiring replacement of the plane, those requiring a major overhaul, and those requiring replacement of a major unit of the plane. These factors are duplicated, in one set considering accidents not resulting from carrier or catapult operation, the other in those which result from carrier or catapult operation. Of course, the total flying time of any unit is one of the most important determinating factors.

The Schiff trophy, it will be recalled, is a beautiful silver cup surmounted by an eagle and bearing the outline of a flying boat. It differs from other trophies in that the award is based on a year-round performance in line of duty and is not based on competitive racing or attempts at records. The Navy considers it a most important award and recent annual analyses of accidents in the navy and marine corps indicate that the trophy encourages the type of flying found to be safest and improves the flying technique of competing aviators.

REGULATING Air C

ARTICLE IV

By E. McD. KINTZ
Chief, Legal Section,
Aeronautics Branch
Department of Commerce

THE AIR COMMERCE ACT of 1926 places within the jurisdiction of the Department of Commerce, the regulation of interstate commerce by air. Air commerce, as defined by the Act, means transportation in whole or in part by aircraft of persons or property for hire, navigation of aircraft in the furtherance of a business, or navigation of aircraft from one place to another for operation in the conduct of a business. Interstate or foreign air commerce means air commerce between any state, territory, or possession, or the District of Columbia and any place outside thereof; or between points within the same state, territory, or possession, or the District of Columbia, but through the air space over any place outside thereof; or wholly within the air space over any territory, or possession, or the District of Columbia.

Any plane or person engaged in interstate air commerce is required to be licensed by this Department. Mention of a few of the examples of interstate traffic which necessitate a license may not be remiss here.

Two flying fields are established in Virginia, just across the river from Washington, D. C. The majority of the flights are sightseeing hops over the District of Columbia, no landing being made therein. Yet this is interstate air commerce due to the fact that it is between points within the same state, but through the air space over the District of Columbia.

Another instance is furnished in the case of a plane operated for hire within the state of Virginia and flown to the state of Maryland over the week-end to be operated wholly within Maryland in carrying passengers on short hops. This is interstate air commerce even though no passengers or property are carried for hire on the flight between the two states. This is a case wherein the plane is navigated from one state to another for operation in the conduct of a business, namely, that of carrying passengers for hire.

Another example: a plane is being flown between points in different states displaying advertising matter on the plane, such as "The A. B. Plough Company." The display of advertising is in furtherance of the business of the "A. B. Plough Company." Even though no passengers or property are carried for hire on such flights, it is nevertheless, engaged in interstate air commerce.

A plane is purchased by a corporation and is flown between points in different states, carrying executives or employes of the company for conferences or for sales purposes. This is regarded as being in the conduct or furtherance of a business. Moreover, if the pilot is employed on a salary basis, such flights could only be made by a transport pilot as such passengers would be deemed to be passengers for hire, because the pilot is paid a salary for carrying them.

Under the present Act, no jurisdiction has been granted the Department to regulate flights which are wholly intrastate, except that the Air Traffic Rules apply to all flights whether they are commercial, non-commercial, pleasure, interstate or intrastate, and whether the plane is licensed or unlicensed. It should be obvious that all flights must adhere to a standard and uniform set of regulations, namely, the Federal Air Traffic Rules.

The Legal Section handles the legal phases of enforcing the Air Commerce Regulations as well as investigation of violations of the Air Commerce Act of 1926, the Air Commerce Regulations, and the Air Traffic Rules. It prepares the assessment of penalties and acts in a general advisory capacity in all matters pertaining to air law.

True enforcement, however, is accomplished through the diplomacy and tact of the field inspectors operating throughout the United States. Many of the violations never reach the Washington Office but are covered in such a manner by the field force that there is no necessity for any other action.

The Section, in its legal capacity, acts on such matters as commenting on proposed state or municipal laws relating to aeronautics, amendments to the Air Commerce Regulations, foreign requirements, compiling state aeronautical laws, interpretations of the regulations and hearings on the denial, suspension or revocation of licenses. It is more or less a clearing house for problems pertaining to the legal side of aeronautics, but from a practical aeronautical viewpoint rather than a strict legal one.

IN CONNECTION with its enforcement duties, we can elucidate our work by taking several examples of complaints or violations and following them to a conclusion.

A letter is received from an indignant citizen to the effect that his Sunday morning rest was disturbed by a plane flying so low over his house that it almost

r Commerce

V —ENFORCEMENT

In this fourth of a series of six articles on the licensing and inspection activities and work of the Aeronautics Branch, Mr. Kintz writes in detail of the work of the Legal Section. The task of enforcing air regulations is by no means an easy one, and often calls for considerable diplomacy by the Section heads. Some of the problems encountered and the procedure followed in handling them are contained in this authoritative and interesting article. ¶The fifth article, appearing in an early issue, is by Dr. L. H. Bauer and Dr. H. J. Cooper, and deals with the work of the Medical Section.

knocked the chimney down. He complains that this happens every Sunday, starting about 8 a.m. Will we please stop such operations? The letter usually ends by saying that he thoroughly believes in aeronautics but does not think he should be annoyed in this fashion.

Such a complaint may or may not be a violation, and several conditions must be considered. In the first place the regulations provided that "Exclusive of taking-off from, or landing on, an established landing field, airport, or on property designated for that purpose by the owner, and except as otherwise permitted by Section 79, aircraft shall not be flown:

"1. Over the congested parts of cities, towns, or settlements, except at a height sufficient to permit of a reasonably safe emergency landing, which in no case shall be less than 1,000 ft.

"2. Elsewhere at a height less than 500 ft., except where indispensable to an industrial flying operation."

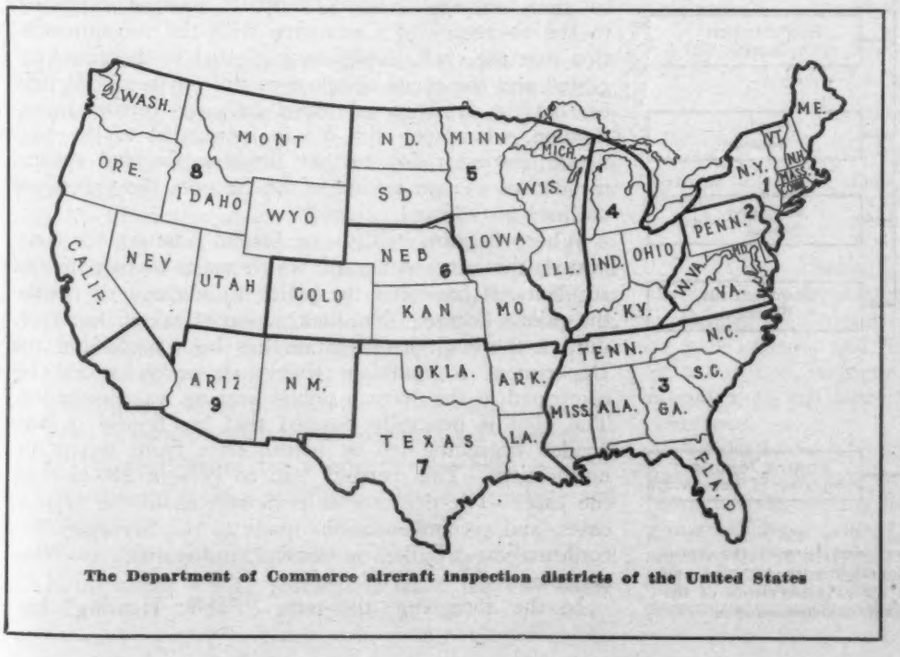
Section 79 also states, referring to deviations from Air-Traffic Rules:

"The air-traffic rules may be deviated from when special circumstances render a departure necessary to avoid immediate danger or when such departure is required because of stress of weather conditions or other unavoidable cause."

IT IS USUALLY the case that the complainant lives in close proximity to a flying field. The low flying is generally the result of taking-off and landing, and his house, due to wind conditions, happens to be directly in the line of flight. Upon referring to the sections quoted, it is obvious that there has been no violation, and, consequently, the Department can take no action to prevent such flights. If the complainant does not live adjacent to a flying field, it may be that a pilot has been forced to fly low because of fog or missing engine. In such a case, too, there is no violation and there probably will never be further complaint.

In either of the cases, the complainant is advised that an investigation will be made and appropriate action taken. The supervising inspector for the territory involved is sent a copy of the complainant's letter with instructions from the Chief of the Inspection Service to investigate and report. When the case is similar to the first example, an inspector usually makes a personal call on the writer of the letter and takes with him the operations manager of the field. They explain conditions and if possible work out a solution that will prevent further annoyance.

In the second example, there is usually no action



The Department of Commerce aircraft inspection districts of the United States

which can be taken except to explain the circumstances to the complainant and assure him that, in the event of persistent violations which can be substantiated, a formal violation report will be filed and penalty assessed.

Both of these cases are premised upon no information having been furnished regarding the numbers displayed on the planes. In the event the Department is advised of the numbers displayed, the owners and pilot are asked, either by letter or by an inspector in person, for an explanation. This is checked against the facts found by the inspector as a result of his investigation.

In any case, where the inspector has found that there has been a violation, he renders a formal report to the Department substantiated by sufficient evidence. Thereupon the penalty prescribed by law is assessed.

IN ANY COMPLAINT made to the Department, the numbers displayed on the plane in question must be given, as this is practically the only means we have of establishing the identity of the violator. If the reader were involved in an automobile accident and proceeded to the nearest police station to report a violation, you can well imagine what the desk sergeant would probably say when, in answer to his question, "What was the license number?" you said "I don't know, I didn't get it."

When an inspector has investigated a violation and submitted a formal report on a form provided for that purpose, it is checked by this Section from a legal standpoint in order that the Department can be assured of the assessment withstanding a public hearing. Like any other violation of law, sufficient evidence must be presented at least to make out a *prima facie* case. If a *prima facie* case is made out the violator is notified that he is subject to a civil penalty fixed by the Air Commerce Act at $500 for each offense, and is usually given fifteen days in which to file affidavits in substantiation of his request for mitigation or remission. Upon receipt of his request, the supporting evidence is weighed against that submitted by the inspector and other witnesses. If the evidence does not justify remission, he is notified that, if a certified check is forwarded in sums varying from $25 up, it will be submitted to the Secretary of Commerce with the recommendation that the civil penalty be mitigated to the sum suggested and the check accepted in full payment. It may be that the evidence submitted calls for further investigation, whereupon the file is forwarded to the particular inspector for further investigation and recommendation. Upon return to the Section, the procedure outlined is followed.

Where flagrant, willful, or second offenses are committed, the very nature of which make them potential accidents, it has been the policy to suspend or revoke the pilot's license. No such action is taken, however, until a thorough investigation has been made and the Department is confident that such action would be confirmed in the event a public hearing was demanded. The pilot is generally notified that his license is suspended beginning ten or fifteen days from receipt of notification. This permits him to present his side of the case. The evidence is reviewed, as in the former cases, and recommendations made to the Secretary for confirmation of the suspension, mitigation or reinstatement.

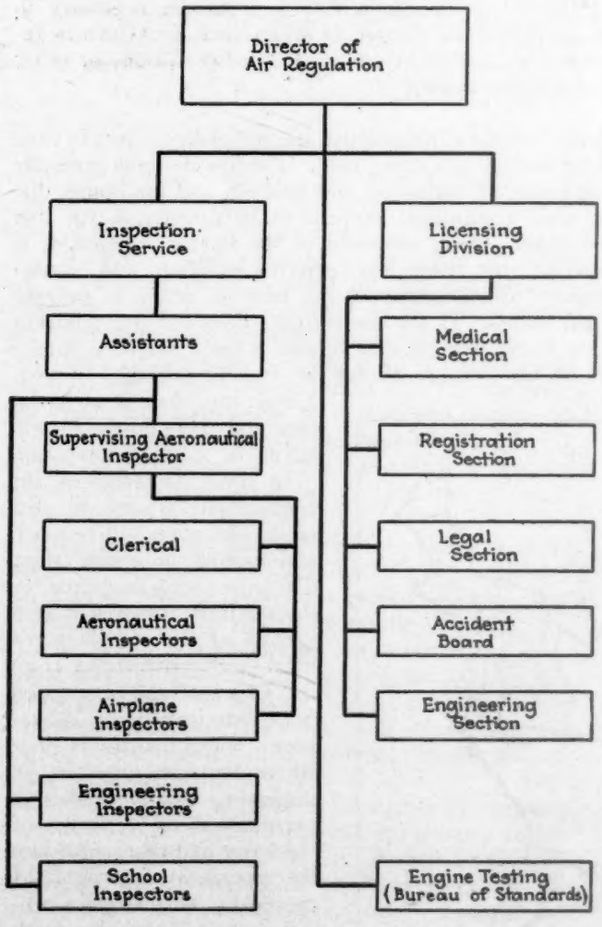
In the foregoing, the term "Public Hearing" has

Table I: Air Commerce Law violations and action taken for the period from July 1, 1928, to July 1, 1929

Violation	Penalties Assessed	Reprimands	Suspensions	Revocations	Dismissals	Penalties Collected
Acrobatics	37	14	21	1	5	$1,065.00
Low flying	14	21	13	2	15	300.00
Unlicensed pilot flying licensed plane	75	84	8	1	7	1,775.00
Flying without identification numbers	8	10	2	..	..	225.00
Flying without navigation lights	6	..	4	..	1	175.00
Totals	140	129	48	4	28	$3,540.00

Miscellaneous Violations

Penalties assessed	36
Reprimands	53
Suspensions	33
Revocations	18
Dismissals	14
Penalties collected	$1,090.00
Cases not yet closed	13
Total violations for period	503
Total penalties assessed	176
Total penalties collected	$4,630.00



Organization Chart of the regulatory activities of the Aeronautics Branch. These activities, together with Airways and Aeronautic Development are under direct supervision of the Assistant Secretary of Commerce for Aeronautics.

several times been mentioned. It is believed that a vast majority of persons outside the Department have no conception of the purpose or meaning of this right granted by Section 3-f of the Air Commerce Act. Briefly, this Section gives a person his "day in court" upon the denial, suspension or revocation of any certificate issued in pursuance of the Act. It is to assure any applicant or holder of a license or certificate of the right of appeal to the Secretary should arbitrary action be taken by any subordinate.

To return to violations, the following may be of interest as indicative of some of the types involved.

Among unusual complaints received are some to the effect that planes of a certain company are continually flying over and spraying the complainant with acid, that aviators flying over the house are causing electric currents to enter the body of the complainant and thus inflicting considerable pain, burning the clothes and filling the house with electric sparks, that certain pilots were flying close to the bathroom window during the bathing hour and acting as "Aerial Peeping Toms." In the latter instance the bather did not obtain the number of the plane and there was nothing we could do. In such cases, investigations have disclosed no violations. If anyone is annoyed in cases similar to the latter, it would seem in order to suggest that a little forethought in pulling down the shade would suffice and obviate the necessity of an official investigation which might become embarrassing to all concerned.

We have also been called upon to compel pilots to pay for damages to cattle or crops. This, too, is obviously beyond our jurisdiction.

There have been anonymous complaints which, upon investigation, have been found to be unwarranted and due to personal animosity. Naturally, no action was taken in the majority of such cases.

Regardless of the character or method of complaint, all are given due consideration and are thoroughly investigated by competent and tactful field inspectors. An endeavor is made to satisfy all concerned in a manner which would best serve the interests of the public and the industry.

Table I shows violations and action taken for the period from July 1, 1928, to July 1, 1929.

THE DEPARTMENT is frequently called upon for a digest of all the court decisions relating to aeronautics, presumably to be used in preparing cases for trial in damage suits. Obviously, the Section cannot act as legal advisor to persons other than those in the Aeronautics Branch, or else we would constantly become involved in all sorts of controversies. While it is not in order to recommend any particular publication, nevertheless, due to the number of inquiries on this subject, those interested will find such a compilation of decisions from 1822 to 1928 in "United States Aviation Reports" published at 1215 North Calvert Street, Baltimore, Md.

Some of the legal questions involved are:

Liability of owner or operator for damage.

Who is owner under partial payment purchase plan?

Liability of owner for accidents over field.

What states require certificate of public necessity and convenience?

What states require licenses and what types?

If operating wholly within one state, what is necessary?

What are the Federal requirements to engage in interstate air commerce?

What state laws affect aeronautics?

A suggested draft of desirable uniform state law on aeronautics has been prepared and is available from the Department upon request. A majority of the states have enacted desirable legislation, but our latest information is that some eight states have yet to enact regulatory laws on this subject.

Hardly a day goes by that we do not receive a letter requesting advice as to where a plane may be flown without any type of license. The address of the inquirer readily gives the reason for the request, which is that the state of residence now requires a license, thus necessitating removal to those states which do not require licenses. Those states having no uniform regulatory legislation will soon find themselves overrun with unairworthy aircraft and incompetent pilots, to the detriment and safety of their citizens.

The following is a list of the states having regulatory aeronautical laws, with the type of licenses required, and those having no laws:

Federal licenses required for all aircraft and airmen:

Alaska	Michigan	South Dakota
Arizona	Mississippi	Texas
California	Missouri*	Vermont
Delaware	Montana	Washington
Idaho	New Mexico	Wisconsin
Indiana	North Dakota	Wyoming
Iowa	Rhode Island	**Except solo pleasure*

Federal licenses required for aircraft and airmen engaged in commercial flying:

Colorado	New Jersey	Ohio
District of Columbia	Nebraska	Philippine Islands
Hawaii	New York	West Virginia
Illinois	North Carolina	

State or Federal licenses required for all aircraft and airmen:

Maine	Minnesota	Oregon
Maryland	New Hampshire	Virginia

State licenses required for all aircraft and airmen:

Arkansas	Florida	Massachusetts
Connecticut	Kansas	Pennsylvania

No law but Public Service Commission requires Federal licenses for commercial operations:

Nevada

No licenses required:

Alabama	Louisiana	Tennessee
Georgia	Oklahoma	Utah
Kentucky	South Carolina	

These laws should be rigidly enforced by local police officers. The Department is only too glad to assist by explaining the federal laws and regulations to meetings of such officers, and their application to the state law. Some of our inspectors have already addressed such meetings, to the mutual satisfaction and benefit of all concerned.

Practically no precedent has been established in Air Law. Consequently, legislators, lawyers, and judges will be pioneering in this field without an established background of legal precedent. Unless all are "air minded" and recognize the infancy of this great new industry and its rapidly changing conditions, the advancement of aeronautics may be irreparably retarded.

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WHAT ARE THE *Prospects*

A Continuation of a Symposium by Leaders in the Industry on 1930

IN ORDER to provide an indication of the merchandising prospects and design trends in the aviation industry during the coming year, questionnaires were sent out by AVIATION to leading executives and engineers in aircraft and aircraft engine manufacturing companies, as well as to a number of other recognized authorities. Many of the replies were printed last week. However, we were fortunate enough to secure many more answers than we had space for in the special issue devoted to the St. Louis International Exposition. Most of those remaining are published herewith. The rest will appear in AVIATION next week.

Executives were asked, in substance, these questions:

1. What is the probable trend of the industry for the coming year, as regards financial industrial organization, and the relation between design, production, and sales?

2. What will be the approximate magnitude of total production of aircraft during 1930?

3. What must be done to keep production and sales in proper relationship without allowing factory programs to become unduly seasonal?

4. What will be done to develop new markets, particularly to expand sales among true private owners?

5. What is the tend of types, of cabin and open planes, two-seaters and three-seaters, and the like, in relation to the prospective market?

Further Mergers Not Anticipated— Airplanes for Executives

By JOHN C. NULSEN
General Manager, Ryan Aircraft Corp.

THE COMING YEAR will bring the first period of intense competition in all branches of the industry. It will see the industry finally settled on a stable business basis, with all the leading companies making efforts to sell the business man and the public on the practical value of air transportation as a time and money saver.

This competition will have a healthy influence on the industry as a whole, bringing about improvements in airplane designs and general business management. It is probable that this era will see the number of companies manufacturing airplanes somewhat reduced. At the present time, the Department of Commerce lists nearly 200 aircraft manufacturers, but the production of 20 of these companies accounted for 85 per cent of the total airplane output in 1929.

Many smaller companies will be unable to survive the competition offered by the big merged groups. It is not likely that the coming year will bring about much further consolidation, and in general, it is believed that the twenty or so well-known independent concerns will remain on an independent basis for some time to come.

The year will see scores of large corporations purchasing company-owned airplanes for the use of their executives and salesmen. The Detroit Aircraft Corporation recently made a survey of the business use of planes, and found that approximately 175 companies own one or more planes. This list will be increased to many hundreds by the end of 1930. In the comparatively near future, it is probable that companies in certain lines, which do not place airplanes at the disposal of their best salesmen, will find themselves as out of date as the salesmen that were using buggies when their competitors were traveling in automobiles.

In order to educate possible users of airplanes, the leading aircraft companies are employing many salesmen. Our company has recently begun to appoint an airplane dealer in every town of over 10,000 population, with factory representatives helping them to close likely looking prospects. The automobile dealer will undoubtedly play an important part in merchandising airplanes during the coming year.

Several of the better known companies are now offering airplanes on the deferred payment plan, and it is probable that the coming year will see more liberal terms and a more general adoption of this plan.

There is not likely to be much change in basic design of planes in the near future, but the new models which many companies are bringing out in the spring will incorporate many refinements in interior design and exterior appearance. There is a marked tendency to pay

FOR THE *Present Year?*

Merchandising Prospects and Airplane and Engine Design Trends

more attention to the comfort of passengers and distinctive appearance of the plane. Brilliant color schemes will probably be more generally adopted. The new planes will have a higher speed than the older models, obtained by using more powerful motors and better streamlining.

Prices cannot be reduced until production materially increases, and because of the use of more expensive motors, more complete equipment, and cabin refinements, airplane prices during 1930 may be higher.

The industry has passed through the stages of engineering design and financing, and in 1930 the greatest emphasis will be laid on placing airplanes and air transportation facilities in the hands of every possible user.

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Inherently Stable Airplanes—Smoother Engines—Lower Costs

By EARLE OVINGTON
Consulting Engineer

IN GENERAL, I would like to make the following remarks as to the present situation and the course to be followed in 1930, to my way of thinking:

First, there should be a greater standardization of types, with several types entirely eliminated. For instance, there are many airplanes on the market which are aerodynamically poor, with poor visability, and bearing every earmark of hasty production in order to get into the field while the getting is good. The aviation industry has suffered from a plethora of funds and this has reacted to the detriment of the models produced.

Earle Ovington

Up to the present time, airplanes have been made for expert pilots, and there is practically no ship on the market today that is safe for any but the expert. In the smaller ships, particularly, the inherent stability is poor compared with that of the large transport jobs. I flew a Fokker, for instance, for over four hours without touching the stick. I know of no small job with which I could have done this. And yet the inherent stability of the smaller ship should be better, if possible, than the larger one, as the former is flown by less experienced pilots.

Today, it is the aviation enthusiast who flies, and he is willing to put up with what he finds in order to gratify his desire. But the "man in the street" is a long way from accepting the airplane as he does the automobile.

Landing an airplane today under any but ideal conditions requires a degree of coordination seldom possessed by the average individual. With an inherently stable ship, fitted with wing surfaces whose characteristics can be altered for low landing and safety at high angles of attack, equipped with a variable pitch and reversible propeller, and with the right type of landing gear or air wheels, an inexperienced pilot should be able to practically pull back on the stick and let the ship land itself. And there should be no tendency to fall off on a wing, go into a spin, or nose over without warning. And we know enough about aeronautic design right now to produce such a ship. The demand not being evident, however, the ship is not forthcoming. We must produce the ship and then build up the demand.

High motor cost is another drawback which must be overcome. Small and medium size motors, particularly, of good reliability, must be available before the airplane is used to any great extent.

Not only must the motor be reduced in price, but it must be so designed that it will operate for at least a hundred hours without the attention of an expert mechanic. The most reliable motors today require such attention every ten hours at least. How much would automobiles be used if their engines required such frequent and expert attention?

Vibration in motors is another point I would like to touch on. Many of the smaller ships are fitted with motors that vibrate so that one's hands are numb after a flight of any duration. Compare such bone shakers with the smooth sixes and eights in automobiles and it becomes obvious that the airplane motor has a long way yet to go. Why the air-cooled, inverted, straight line six has not come into general use in airplanes is more than I can understand. This would mean good visability forward, smooth operation, good streamlining characteristics, and valve mechanisms that would operate in oil without ten-hour servicing.

From a selling standpoint, we are not reaching the man in the street. If an inexpensive ship of great reliability and high stability were available it would not be long, with the right selling methods, before we would cross the gap which now exists between the average man and the aeronaut. And until we bridge that gap we will have a highly specialized industry.

No Reason for Alarm

By WILLIAM O. WARNER
President, Warner Aircraft Corp.

ANY ATTEMPT TO APPRAISE the aviation industry's prospects for 1930 seems to be rather difficult, and would be merely a guess at this time. However, those manufacturers who have produced quality products during the past years should, in our opinion, enjoy a considerable increase in business.

We view the present so-called slump in the industry as nothing more than the usual seasonal recession which must be expected each year for some time to come. Past records would indicate that most manufacturers have ignored this phase entirely and there will probably be a large number who will continue to do so each year. This condition will naturally have a bad effect on the industry as a whole, and especially on the offenders.

As to the trend in design and type that will be the most popular during the coming year, we hesitate to make a guess, but feel that the St. Louis show will determine these questions.

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All First-Class Mail by Air—Stabilization Lies Just Ahead

By E. E. WILSON
President, Hamilton Standard Propeller Co.

THE TREND OF THE INDUSTRY for the coming year is toward increased operations in the transportation of mail and passengers, and increased private flying. Air transportation is definitely out of the luxury stage and approaching the status of a necessity. Air mail, which a short time ago was a luxury, could not now be dispensed with. The other phases of aeronautics will follow this line with the passage of time. The sound organizations will emerge stronger than ever, and the industry as a whole will profit from deflation.

The records of the past few years indicate a steady increase in the total production of the industry to date. There is every reason why this should continue. Almost unlimited opportunities are available. As experience determines the proper place of aeronautics in the general scheme, development will go ahead steadily.

At present, it is difficult to prevent factory programs from becoming unduly seasonal. The expansion of flying activities into those parts of the world where all-year-round flying may take place, wlil help to solve this problem. It is still too early to talk of standardization, but as time goes on, and certain types of aircraft engines and equipment establish their superiority, it will be possible for factory management to plan production more intelligently, and utilize the slack periods in filling inventories for the peak demands.

Three important lines of development appear open: (1) the expansion of air mail routes; (2) intensive development of mail and passenger routes to Latin-American countries where existing forms of transportation are not competitive; (3) expansion of private flying.

Authority already exists for extension of air mail routes. If funds were made available, this could be carried on rapidly. It seems to me that the aeronautic industry might well sponsor a program looking forward to a complete shift in the handling of mail, with a view to speeding up all along the line. This would contemplate carrying all first-class mail by air over trunk lines, and speeding up the service of other classes of mail to make the improvement in service comparable. The influence of such a step on air transportation of passengers would be profound, and some method might be worked out which would not result in hardship to other carriers.

In the matter of development of true private flying, it is possible that the inflation of the past year may turn out to be an advantage. Overstocks may result in reduced prices to owners, with corresponding increases in private flying and with the passing of obsolete wartime equipment. This may well pave the way for important increases in new equipment for 1931 and the years beyond.

Conscientious effort, intelligent planning and hard work in the year 1930 will reap adequate awards. This year appears to me to mark the transition into the stabilized period of commercial aeronautics.

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A Banner Year Ahead—More Accurate Performance Data Needed

By HENRY H. OGDEN
General Manager, Ogden Aeronautical Corp.

IT IS A CERTAINTY that 1930 will be a banner year in the progress and development of aviation. An extensive program of expansion has been layed out, not only by the government, which plans to spend over $95,000,000 on aeronautical activities, but by the air transport systems of the country, the various schools, and private flyers. This expansion program should make itself felt in all branches of the industry.

H. H. Ogden

More money will be spent but it will be spent wisely and there will be less stock promotion schemes. The industry is becoming more stabilized and "wildcatting," the introducing of impossible new types of ships by firms without adequate financial backing, although it will continue, will gradually diminish. The public has begun to realize that though all planes have wings, not all of them will fly successfully; instead, money will be invested in those firms which have demonstrated a gradual and healthy growth.

The design of planes will not change materially, but there will be a decided move on the part of designers to incorporate higher safety factors in their ships and a greater degree of comfort for passengers. I believe that the year will see air mail increase to such proportions that special planes for mail only will be required, in which passengers will not be allowed to ride in the interests of safety.

A change which the industry needs, but which it probably will not get for some time, is the creation of an official source for homologating all performance data. Speed, rate of climb, cruising range, and all other performance characteristics are apt at the present time to be subject to a discrepancy between the data shown in advertisements and the actual physical performance of the ship itself. If some adequate means of checking could be devised, somewhat similar in function, possibly, to the Audit Bureau of Circulations which authorita-

tively passes on magazine circulation figures, the industry as a whole would be far better off and the buying public would be protected from misrepresentation, unintentional or otherwise. The trouble, heretofore, has been that to get a series of accurate figures it was necessary to have expensive equipment, as for instance an electric timing device, and this has been out of the range of most manufacturers. Steps should certainly be taken during the forthcoming year to provide for some authoritative method of rating aircraft performance.

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Importance of Financing for Private Ownership

By A. W. POOLE
Manager, Aviation Department, Los Angeles Chamber of Commerce

READJUSTMENT AS TO PRODUCTION and distribution, addition or creation of new and stable markets, and a considerable expansion of operating enterprises: these four fields are those that will chiefly concern commercial aviation leaders in 1930. Perhaps the most important of these is the matter of distribution. What will be the market and how will that market be made? Expansion of operating transport enterprises and inauguration of new transport lines will of course make a market for some of our manufacturers; more mail lines, many of them, when in operation will assist the producer of that type of aircraft.

But necessarily there must be a financial program set up either by the manufacturer or companies formed for the purpose, to assist the individual purchaser of aircraft, the private owner, or the man or woman who wants an airplane entirely for non-commercial use. There are thousands of persons in this country—yes, tens of thousands—who have an eagerness to learn to fly and own their own planes, but the cost is prohibitive when it is necessary to lay the cash on the line. Therefore, that person loses the serious desire to learn to fly, knowing that after spending the time and money for instruction he or she cannot afford the purchase of a plane.

In any city in this country a man can purchase an automobile at the rate of one-third or less of the purchase price as the first payment and the balance spread over a period of twelve, eighteen or even twenty-four monthly payments. He can use and enjoy that car while paying for it; in some cases he can put the car to work to pay for itself. Why not the same with aircraft? Until such a time comes, it looks as if the manufacturer of the smaller plane, the two-, three- and four-seater particularly, will have to stay on a curtailed production basis. It seems creditable enough also, with the prices being received for small aircraft today, that manufacturers might arrange through the distributor or directly to establish schools to teach the purchaser to fly the ship he buys, and at the same time sell it on the term contract plan.

The airplane manufacturer has a vehicle of transportation to sell just as the automobile manufacturer has, and it is up to the airplane manufacturer to work out a satisfactory and economical sales program, just as it was necessary for the automobile manufacturer to do so.

The airplane is used many ways, for express and passenger transport, mail, crop dusting, forest patrol, aerial photography, schools, scientific studies, etc.; but the large demand will always be from those who want the craft for sport or non-commercial purposes. That is where the demand is now and where the manufacturer will have his outlet when the cost of the ship is what it should be, and an adequate, feasible plan of individual financing is established.

The year 1930 should be an even more successful year than the year just ended. Vast strides have been witnessed, particularly in respect to passenger, express and mail transport. There will be many more transport lines, passenger, mail, and express; there will be a very large increase in export. But to overcome the critical stage of over-production that the industry is now suffering, some method must be devised to sell the airplane to those who wish to own one.

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Continuance of Rapid Progress Looked For

By C. O. DURRETT
Ass't Sales Manager, Alexander Aircraft Co.

THIS YEAR SHOWS every indication of providing a healthy growth in aircraft production and sales over 1929. The airplane selling season, too, will be opening early, probably within about thirty days, gradually gaining momentum into the summer months.

As we all know, 1928 was the big year as far as expansion in the industry was concerned. Few manufacturers were able to supply their markets. Their efforts to prepare themselves for the next season brought about facilities for over-production and 1929 saw most of the established manufacturers hustling to find an outlet for products of their factories.

Notwithstanding this condition the aviation industry as a whole made great progress during 1929. This year will see it settling down on a solid foundation and a normal expansion of utility. There will be more airplanes sold but we are going to have to sell them.

In total production there ought to be at least twice as many airplanes sold as last year. Our company is counting on its share of the business being more than double. A large number of the planes will be purchased by new users who have been conservative in adapting aviation to their own work earlier, but who are finding now that they must use it to keep their place in industrial growth.

There will be many replacements of airplanes in 1930. Especially will present owners of low priced planes demand more expensive ones. Most of the airplanes sold by our company have gone to users as first planes. Now these same owners are wanting more power and speed. They also want cabin types.

These first-plane owners have been learning how to use their airplanes in more ways than one. Some of them acquired flying hours to make them expert pilots. Others made money with their ships in commercial operations. Still more found that airplane travel was a distinct adjunct to their business. Having gained these experiences with airplanes of the low priced field they are going to be ready for something more comfortable, more powerful, and faster, with still greater possibilities of usefulness.

The replacement tendency will, of course, throw a large number of good used airplanes on the market just

as always happens in the automobile industry. There is little probability, however, of developing a used airplane problem for some time. There is a difference. Airplanes do not depreciate in usefulness as rapidly as automobiles. They are still safe and serviceable after having worn out several motors. Used airplanes made available through replacements will be immediately purchased by a new crop of owners who want planes but who do not feel the necessity of the greater speed and power of this year's product.

A cross section of present airplane distributor and dealer organizations shows a heavy predominance of automobile men. This is going to be good for the aviation industry because these men know how to sell transportation and because they have had lots of experience in replacing old automobiles with new ones. They have a good idea of what a used plane is worth and where it can be sold. They know enough not to become overstocked in used planes and yet they will not pass up new sales without studying their prospects to reveal those who would be particularly suited by such a used ship.

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Public Education and a Sales Campaign

By VICTOR H. ROOS
President, Lincoln Aircraft Co.

IN RESPONSE TO YOUR invitation for comments on the general position of the Aircraft Industry, my contribution is as follows:

As an industry, it is quite embryonic because—Few in the industry are making a profit. There is approximately $100,000 invested in the industry for each airplane in commercial use.

Approximately 90 per cent of all planes, other than military types, purchased last year were taken within the industry itself. These planes were purchased by schools, transport or mail lines, or by companies who purchased the plane with a view to further their interests in the industry or to promote aviation.

The balance of approximately 10 per cent of the airplanes that were bought (I say "bought" and not "sold") were purchased by private users for pleasure and commercial uses other than those mentioned above.

There is but one airplane for every 15,000 of population in the United States, and but one-half of these planes are being used to any great extent. There is little evidence that a real merchandising plan has been put in operation by any manufacturer for the sale of airplanes to the average citizen. Merchandising is educating. Until the average citizen is educated to the point of understanding the airplane, he is not ready to buy; and until the average citizen is ready to buy, the industry will remain embryonic.

As long as it is such, production, design, profits, and all connected with it will be retarded; but once there are sales, all ills will be cured, as the airplane is economically sound. The average citizen is not accepting aviation as we had hoped that he would, and this is largely because of the manner in which we have gone about selling him.

Flying must be sold as a means of transportation, not as a heroic stunt to be taken part in by but a few daredevils. The destiny and progress of the industry lies in its own hands. I suggest that the manufacturers and operators, as a whole, use a concentrated, collective, cooperative method to educate the public to the practicability of the airplane. Remove the mystery from aviation and teach the business and professional men, who can afford to buy and own airplanes, to fly.

This will be done in a convenient, economical and businesslike manner, and this training must be brought to their very door if we are to have it purchased in any quantity. The airplane industry needs the confidence of the average citizen, and this will be obtained only by conducting flying institutions in a businesslike manner, with regularly established prices, and without radical and spasmodic declines.

It is the writer's opinion that sales this year will probably total 15 per cent more than in 1929, and this increase will be almost entirely due to purchases for noncommercial uses such as training and sport.

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Benefits of Mergers

By F. H. RUSSELL
Vice-president, Curtiss Aeroplane & Motor Co.

THE DEVELOPMENT of commercial aviation in 1930 will doubtless follow along the lines of the industry's experience in the year just past. The strengthening of the industry through the grouping together of a number of unit organizations will begin to become evident along all lines of endeavor. The engineer will have the benefit of more mature and widespread counsel to lead him to meet in his new designs the crystallized demand of the operator and user. The manufacturer will find a market for the raw material better adapted through quantity purchase to meet his requirements at a lower price, and individual units will be able to specialize on particular types of ships, thereby increasing production and decreasing cost.

The building up of chains of flying fields under central control will stabilize training and passenger carrying, serving the public more efficiently and economically. The operating passenger lines will doubtless reduce their fares and look for increased revenues through increased use of their facilities by the public, and it is to be hoped that their timetables may be so coordinated with one another as to make air travel more convenient. I believe the development in every phase of aviation in the coming year will be on a more permanently progressive and saner basis than that of the year just past.

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Export Chances

By THOMAS W. SIMMONS
President, Simmons Aircraft Division, Steel, Inc.

THE AVIATION INDUSTRY has paid dearly to learn the inevitable. Last year brought kaleidoscopic changes. Everybody talked in big figures; hundreds of millions were dumped into the industry's coffers for the use of men, most of whom were little qualified by experience to handle this new power that abundant money gave them. The money was spent on all kinds of wild schemes; stock manipulators made huge fortunes for a few; and then came the realization that the industry needs business men as well as experienced aviation enthusiasts.

Now we enter 1930 with a more chastened spirit. Large combines have been formed to reduce murderous

competition and duplication of effort. Real business men head them, eliminating waste and top-heavy overhead. They are getting to their tasks in real earnestness, analyzing, studying; they have set a goal and are consistently striving to reach it.

Because of this the industry will succeed. The immediate future holds bright prospects for the production and sale, not of tens of thousands of planes, but of a consistent increase.

To my office, as an exporter of American-made aircraft, come more than two thousand cables and letters a month from every country in the world. All express a vital interest in American-made aircraft and the desire to put them to useful tasks in the homelands of the writers.

America's surplus aircraft, and now they number in the hundreds, must be exported. The far reaches of the world are fast awakening to the utility of aircraft. Surface conditions make other means of transportation prohibitive. They look to the sky for the fastest, most luxurious and modern method of transportation. Here there are no highways to build, no expensive rails to lay; and the airplane conquers mountains or desert, land or sea, to inaugurate a new era in foreign trade.

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Better Outlook for Private Owner Sales

By R. B. BARNITZ
Director of Airports, Los Angeles, Calif.

I BELIEVE THAT the aviation industry is now going through a natural readjustment and the near future will see closer coordination between production and marketing, with lower price levels reached, at which time the sale of planes to private owners will be materially stimulated. Prospective buyers are now carefully looking over the market, and when stabilization of the business brings about lower purchase and maintenance costs this type of owner will be one of the chief factors in the aviation picture.

Experience and business capital are bringing about increased efficiency in production, marketing, and operating methods, and before the end of the year I look for the industry to be on a much improved basis.

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Sober Financing—Business Management by Business Men

By O. E. SZEKELY
President Szekeley Aircraft & Engine Co.

TO MY MIND there can be but one move in the financial construction of the industry in general, including the various organizations, and affecting them both individually and collectively, and that is toward sound financing without overcapitalization.

It seems that the splurge is over and that there is no more to be had; during the past year we found the old saying of "Easy come, easy go" well illustrated. This also affected not only organizations, but the product itself by its design, because the easy manner in which finances were acquired permitted an easy manner of getting the product before the public, and the easy manner with which the product was so produced was such that public representation was not made by quality but, unfortunately, by quantity.

In regard to sales, may I not call attention to the topsy-turvy methods, rather unbalanced, and not at all systematized. The hands of the flyers, the pilots, and the mechanics were seen more often than the faces of well-groomed, experienced and business-like representatives.

In 1930 all of these questions will have to be definitely settled on the following basis: (a) Proportionate but substantial finance; (b) Progressive design coupled with safety and strictly for the purpose for which it is intended, rather than for an all-around job, and in keeping with the foundation and reputation of the company; (c) Systematization and basic standardization of sales, with handling by capable sales and business men.

2. It is hardly possible even to approximate production for 1930, but it does seem that 1930 will absorb all the legitimately and fundamentally correctly produced aircraft and aircraft engines, and that these products, if classified in the proper manner, will receive an open market sufficient to sustain an industry that can grow quite proportionately to the basic correctness of its product.

The products should be definitely denominational in their specific classes; for instance, training ship, sport ship, commercial ship, or air-liners. By so dividing and so selling ships for the purposes for which they are intended, it will be made impossible to abuse them or to operate them out of the capacities and possibilities which the particular product should reasonably offer.

3. Progress, advancement in design and improvements in the product compatible with the territory in which it is used and with the season during which it is to be operated seem to be the only present answers to make it possible for factories to operate in seasons at present necessitating them to be at a standstill.

4. There is a very decided and definite market open for the so-called sport ship, or privately owned ships of various sizes. However, no other single factor can enlarge this market better than sufficient and sound propaganda for the absolutely correct and proper operation of planes.

A private owner using a plane for private purposes naturally demands the best, and until such time as he can feel definitely convinced that makeshifts are a thing of the past, he will not accept the product.

5. The question of single and two-seater or three-seater ships, also the so-called open and closed types is debatable; nevertheless comparable to the roadster, coupé, two-door and four-door sedans in the present day automobile industry. The best answer is another question—What do you see most?

THE FOLLOWING QUESTIONS, given in slightly abbreviated form, were asked leading engineers in charge of airplane design:

1. What is the general trend of design likely to be, and in what phase is greatest progress likely to be made?

2. How much further evolution is to be expected in the design of very large planes, and what prospects are

there for the immediate production of very large planes?

3. How much increase is there likely to be in the use of aerodynamic novelties and striking departures from accepted form, such as the slotted wing?

4. Which way will the weight of favor swing in the controversy between cantilever and externally braced wing trusses?

5. Will unit wing loading continue to rise?

6. Are aspect ratios likely to increase, decrease, or remain approximately the same, on the average?

7. Will metal construction tend to replace wood, and if so, how rapidly?

8. Will metal construction continue to be predominantly of duralumin, or will alloy steel strip gain favor?

9. What developments are to be looked for in the near future in landing gear design?

Higher Speed in Pursuit Types

By ARTHUR E. RAYMOND
Ass't Chief Engineer, Douglas Aircraft Company, Inc.

SINCE THE "fall of the year" in New York, prophecies on any subject by anybody have rather fallen into disrepute. However, a few facts concerning the aeronautical design trend are apparent and conclusions from them appear to be reasonably safe.

The designers of military airplanes are, at present, laying more and more stress upon performance characteristics and the next twelve months should show a considerable increase in the performance of the various military types. To this end, new designs will be aerodynamically cleaner and will doubtless incorporate such factors as metal monocoque bodies and retractable landing gears. Military planes have each year been incorporating more metal construction and it is generally conceded that this trend will continue. Next year should see the high speed of pursuit planes well over the 200 m.p.h. mark and other types of military aircraft will not be far behind.

One of the most significant developments of the past year in the commercial field has been the growing interest in gliding. The experience gained and opinions developed through this channel should lead to greater appreciation of the advantages of low wing-loading and greater interest in the light airplane. Just as development of military airplanes is being affected by demands for performance, so will the development of commercial airplanes be affected by the demand for safety. Low landing speed, increased control at stalling angles, and simplicity of power plant, will all be intensively studied and results are bound to follow. Since leisure, coupled with economic necessity, is an ideal combination for thought, it would seem that the next twelve months should show great development.

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Refinements in Detail—Paving the Way for Larger Size

By H. E. WEIHMILLER
Consulting Engineer, Dayton, Ohio

IT IS VERY LIKELY that 1930 will not bring forth any radical departures or improvements in the general trend of airplane design, progress being confined to the simplification of designs and cleanness of detail, with appeal to the public's approval, and lower manufacturing costs, rising in importance. Cleanness will require the universal adoption of such speed increasing details as fillets, fitting caps, special cowlings and wheel streamliners, while interiors will lose their last traces of machinery appearance and be more luxuriously fitted and finished than our best automobiles.

The coming year will probably lay the solid foundation for, but not complete, the construction of large machines up to about 40-passenger capacity, with several seaplanes exceeding this. Such craft will be carefully designed and tested with the idea of being available for needs several years from now and with no immediate gain to the sponsors. Such a program necessarily requires the support of companies with great financial backing, and hence should be able to produce results worthy of the efforts and expenditures. These planes will be larger in proportion than a comparison with present ones would seem to warrant, due to the fact that they will have proportionally more equipment, comfort, safety apparatus and conveniences to insure their use.

Aerodynamic novelties are on the wane in this country, even where their use adds a few miles per hour and increases safety of control, due to the fact that designers are acquiring the same results through cleaner design and more refined engineering.

On small and medium sized planes, the strut bracing will predominate, with a gradual evolution to full cantilever wings in the very large planes. However, this will be impeded by the lack of suitable skin coverings for the stressed skin type, which in turn is due to lack of data and precedent.

Due to the increase in the use of thicker wing sections with higher lift per unit area, wing loadings will apparently increase but actually stay about the same.

Aspect ratios of land planes will not vary much from the present, while those of seaplanes, especially of the externally braced type, will increase gradually.

Speaking of the industry in general, the next two years will probably see the passing of wooden spars and main structural members except for a few companies who will continue to use them to the bitter end of the controversy. This transposition to metal in some form will not take place in volume until some series of incidents, probably trivial in actual importance, strikes the public's whim.

At about the time of cessation in hostilities of the wood-metal war, there will be a prolonged battle between the exponents of steel construction, in its various forms such as square tubes, formed sheets and strips, and the confirmed users of aluminum and other light alloys. At such a time, the virtues of each type of construction will be as important in sales arguments as any other one factor.

The trend toward wider treads for airplanes is rapidly gaining headway, to an extent where it may be overdone. More attention is being paid to landing gear design with an eye to increasing its ruggedness and long life through better, but not necessarily softer absorbers. Rubber cords hardly pass any more, with the present reliability of oleo type mechanisms.

It is felt that the past and the present years will serve as the final period for the determination of what is wanted and how it is to be made, and that the results of this will constitute the basis for manufacturers adopting a particular type of plane, construction and policy which will be followed for the next three to five years.

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Bright Future for Slots and Flaps—More Extensive Use of Metal

By C. J. McCARTHY
Chief Engineer, Chance Vought Corp.

FORECASTING is always a hazardous occupation and nowhere more hazardous than in the rapidly advancing airplane industry, and so one hesitates to make predictions except along the broadest lines, and even then one may hope that the forecast will be safely buried in oblivion before another year rolls around.

Nineteen-thirty promises to be a busy year for the designer. With insistent demands from operators for higher cruising speeds and better performance generally, and with pressure from sales departments for conspicuous engineering iprovements to make the airplane outstanding in its field, the designer will be put to it to develop to the practical limit of all aerodynamic or structural aids he can find.

The results of the recently completed Guggenheim competition have given a convincing full scale demonstration of the value of slot and flap combinations in reducing landing speed and it is to be expected that the coming year will see a more extensive application of these devices.

It is safe to predict that there will be a more extensive use of metal. More and more designs will swing from wood to metal wings. Light planes will probably continue to use wooden wings, but the larger commercial airplanes and substantially all airplanes designed for the military services will have metal wings. Fabric covering will probably be used for reasons of economy in cost and weight except on high speed monoplanes or in other cases where the additional torsional strength furnished by the metal covering will justify its use.

There will be an increase in number of metal monocoque fuselages, particularly for military aircraft, but it is likely that the bulk of commercial production will continue to use welded steel tube construction.

Duralumin will be the preferred metal for the present but it will eventually have to meet serious competition from stainless steels. A great deal of progress has been made in the technology of the making and manipulation of stainless steels. Research work is being actively pressed by several large steel companies, and commercial applications are already being made in the automotive field.

The advantage of using a material which frees one of worry about corrosion and which does not require frequent repainting, is quite obvious, and it behooves designers to keep in touch with this development.

Expects Higher Wing Loadings

By F. W. WEAD
President, Aeronautical Safety Rating Co. of America

IT WOULD SEEM that 1930 should show consistent improvement in production airplanes through more efficient planning and design, particularly as regards aerodynamic interference between parts, and intelligently devised structures which reduce weight without sacrifice in strength and are serviceable.

2. It would seem that large airplanes now built and undergoing experimental flying more than meet present requirements. The air transport operators apparently, despite reduced fares at which they cannot possibly make a profit, are having difficulty obtaining satisfactory loads with present equipment. It does not appear that any demand for larger planes exists.

3. Flaps and slotted wings seem certain to grow in favor. "Flying Wings," extreme taper and other novelties will be more widely tried than heretofore.

4. The advantages of the cantilever wing seem to more than outweigh its disadvantages, and improved multi-sparred design and wider use should gradually break down the opposition to it.

5. It is believed that the demand for high speed, together with a greater number of improved airports, will cause unit wing loadings to continue to rise.

6. While it is difficult to generalize regarding aspect ratios because of the wide variance in different types, improved airfoil sections may cause them to decrease somewhat.

7. Metal construction will probably not increase radically until manufacturers have greater assurance of quantity sales and hence are justified in making the initial outlay for equipment essential to economical production of all-metal types.

8. It is believed that duralumin will more than hold its own against alloy steel strip. Better control of heat-treated duralumin properties will greatly improve its use and serviceability.

9. Few changes in landing gears are anticipated. Retractability will be experimented with.

It would seem that the company which designs and promotes a serviceable two-place "flivver" airplane, of good flying characteristics, to sell for $1,500 or $2,000, will find a splendid market. This will undoubtedly require a considerable expenditure of money to develop a suitably reliable power plant, as none exists today.

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More Metal, But Not Welded

By M. C. BAUMANN
Chief Engineer, Butler Aircraft Corp.

I BELIEVE THAT the greatest progress in the immediate future will be made through the use of better streamlining such as N.A.C.A. cowling, "pants" on wheels, better fuselage shapes, etc., because it involves nothing new or radical.

2. The use of wing slots will increase.

3. Wing loadings have about reached their maximum for some time.

4. Aspect ratios may be expected to increase with better materials and better engineering available, especially in commercial airplanes.

5. All-metal construction will rapidly increase, prac-

tically displacing wood and fabric within five years, and welding will decline due to the variations it makes and the large human element involved.

6. Forgings will gradually replace welded built-up parts.

7. In metal construction the light alloys will predominate in contrast to steel which must be relatively thin and of complicated sections, and which must be generally fabricated in the hardened state.

8. Ratios between cantilever and the externally braced wings will remain about the same.

9. The successful development of larger planes must wait for satisfactory engines of greater power. No doubt a few new larger planes will be built with present motors.

10. The use of geared engines will no doubt be more common in the near future, especially in the commercial class.

11. More liquid cooled engines will make their appearance.

12. The general design of landing gears will remain about the same, excepting that the travel will be increased where slots or similar devices are used. I also expect to see retractable landing gears used in some of the high-speed airplanes.

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More Tapered Wings—Less Parasite Resistance—Novelties in Control

By PROF. ALEXANDER KLEMIN
Daniel Guggenheim School of Aeronautics, New York University

THERE SEEMS TO BE NO REASON why further progress in the direction of aerodynamic perfection from the point of view of streamline should not come rapidly. Further study by designers and aerodynamicists should eliminate almost all exposed or unfaired parts, and the racing airplanes of today may serve as a model for the commercial airplane of the future. A fruitful field of study should be the tapered wing, in which a constant center of pressure should be obtainable with little sacrifice of efficiency and maximum lift.

Alexander Klemin

While the air-cooled engine offers many advantages, in large machines liquid cooled engines hidden in the wing with Prestone cooling, reducing the radiator to a minimum, will offer great advantage from the point of view of performance. The combination of air-cooled engines in proximity to the wing is a source of far greater aerodynamic loss than is apparent from the drag of the engine nacelles themselves, and designers will find in this effect additional arguments for the use of liquid cooled engines in large planes.

The Safe Aircraft Competition has among other things indicated the practicability of the floating aileron, which on theoretical grounds is perhaps the very best type of lateral control yet devised. The Safe Aircraft Competition has indicated also the practicability of the Handley Page slot in combination with rear flap, and constructors will sooner or later come to the employment of this device.

The immediate employment of land planes of greater size than the largest at present available does not seem probable, but the experience with the DO.X and the necessity of large proportions for seaworthiness would lead one to believe that many other attempts will be made to build very large flying boats, and that such attempts are well worth while.

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Merchandising Will Control Design

By LIEUT. LLOYD HARRISON, C.C.
In Charge of Structural Analysis, Bureau of Aeronautics, Navy Department

I AM INCLINED to think the questions are rather too general and conjectural to be of much significance in the next year, when there should certainly be a primary interest in the struggle to survive, rather than in the pursuit of ephemeral advances. I look for building to close prices, with "gadgets" added for sales purposes at the moment.

Specifically, however, I will give a few guesses at the answers to your questions, which may be of some bearing in a tabulation summary, perhaps.

1. Greatest progress in the next few years should be in the direction of improving the endurance, under operating conditions, of the relatively refined types of structure.

2. No very large planes right away by responsible and experienced companies.

3. More use of slots, etc., than their value merits, in an attempt to capitalize consumer demand coming from the Guggenheim tests publicity.

4. No guess.

5. Not much change.

6. Not much change.

7. Yes, very rapidly in military machines.

8. Duralumin very largely, but some forced progress in steel strip, particularly stainless steel.

9. No guess.

Further contributions to this symposium will appear in next week's issue.

PROMINENT aircraft engine designers were asked substantially the following questions:

1. Is the liquid-cooled engine likely to regain substantial favor during the coming year?

2. Will air-cooled engines continue to be predominantly radial in form?

3. What are the most important improvements in engine performance to be anticipated in the near future?

4. Do you think that it will be possible to make further increases in compression ratio without change of basic fuel?

5. Are you in favor of a marked improvement in standard fuel as governed by specifications?

6. What is your opinion of the probable early future

of the compression-ignition type of engine in aircraft power plants?

7. Do you look forward to marked innovations in cylinder arrangements?

8. What is the prospect for the use of materials outside the ordinary present range of commercial practice, such as magnesium, and of new manufacturing processes, such as the forging of cylinder heads of duralumin?

9. Are you satisfied with the present type of engine mounting and the ways in which it is applied?

10. Are any marked improvements in accessory installation and in "plumbing" to be looked for?

11. Will there be a trend towards the building of unit power plant sections, with the engine designer providing for standard mountings, cowlings, and accessory locations?

1,000 Hours Between Overhauls—Radical Developments Likely—Simplification Needed in the Interest of Economy

By ROBERT W. A. BREWER
Consulting Engineer

MY PERSONAL VIEWS as to the probable technical development of aircraft engines in the near future divide into two distinct types of power plants which are likely to be of importance. First, there is the group which would be exemplified by an engine developing about 500 b.hp. and the smaller group developing around 200 b.hp.

R. W. A. Brewer

I fully believe that such engines as are larger than members of the first group, for example, developing 750 to 1,000 b.hp. are more likely to be liquid cooled than air cooled, as it would seem that the practical limit of size of an air-cooled engine in a form which is convenient for mounting and cowling, is reached at a power limit around 600 b.hp. or thereabouts. I do believe that larger engines will have in-line arrangement of cylinders in one form or grouping or another and that the weight of the plant will not be much different from what it now is, for a similar type of engine. I believe that the period between overhauls will be extended to 1,000 hr. and this will probably be due to the use of improved materials and higher working temperatures of certain parts upon which carbon is now precipitated. It is quite probable that the specific output of engines will be increased to a small extent, possibly 20 per cent or thereabouts, but there are so many difficulties which come in, when compression alone is raised in engines of the conventional type, that we must look to other modifications in design and functioning in order to give the increase in power which it is firmly believed will be attained in the next year or so from the same cylinder dimensions.

I do not believe that fuel per se, as governed by specifications, is going to be the factor which counts so much as methods of handling it and controlling it in the process of burning. If we do have compression ignition types of engines it will not really be because of any reduction in fuel hazard, because I do not believe very much in the claims made in this direction, but it will probably be for other reasons, for example, economy and better distribution.

It is quite likely that some unconventional cylinder arrangement will come into prominence for a very definite reason, as there are numerous disadvantages in all the existing types of well known arrangements, and I am certainly not satisfied with the present types or engine mountings or applications. It may perhaps be an exaggeration to say that the average aircraft engine is made for any purpose other than mounting in an airplane, but it would often seem to be the case because of the difficulties and disadvantages attendant upon the mounting of the usual engine.

It is the experience of those with whom I am associated that the mounting of an engine absorbs a large proportion of the actual cost of the power plant equipment, and this should not be the case, if the proper relations were maintained between engine designers and aircraft designers. I think it most imperative that cooperation and coordination of the friendliest character should exist between these two branches of aircraft engineering, and it is only by such action that we can hope to bring the cost of a well equipped plane within the reach of the large section of the buying public which we desire to interest as customers.

It is my firm belief and has been all along that if we are going to produce the right article at an attractive price we must strive for simplification of parts, using the most suitable materials which we can obtain for specific purposes where they will give better service than materials of lower price. At the same time, there are many reasons for using commercial materials where possible when they are clearly suitable for the purpose for which they are intended. I do not believe in unnecessary expenditures for surface finish for appearance only; but certainly where finish is used in order to make examination more satisfactory, it is justified.

In a nut-shell, we want better engines for less money.

• • •

Radials Best for Low Powers—No Compression Increases—More Magnesium, and New Alloy Steels

By L. A. MAJNERI
Ass't Chief Engineer, Warner Aircraft Corp.

WE DO NOT THINK that liquid-cooled engines are going to regain substantial favor during the coming year, especially in commercial aviation. Liquid cooling, mainly when using Prestone, seems to be very beneficial where it is necessary to get the last fraction of power out of the engine as is the case in military high-speed pursuit ship operation. The disadvantages for commercial aviation, especially for engines of low

horsepower, more than counteract the advantages gained.

2. According to our opinion, the differentiation between liquid- and air-cooled engines is much more important than the subdivision of the air-cooled engines according to the cylinder arrangements. It is the opinion of our company that for low horsepowers the radial engine offers the advantages of low weight and the absence of torsional vibration, which two advantages more than make up, in our opinion, for the slightly greater frontal area. On larger horsepower engine, say above 250 hp., a point may be reached where the reduction of the frontal area may warrant some special cylinder arrangement despite some inconveniences.

3. Most of the improvements, and most of the efforts, in the near future of all serious aircraft power plant manufacturers are going to be bent towards increasing the reliability of their product to high standards undreamed of at the present time. These efforts will consequently prolong the life of the power plant between overhauls and will decrease the cost of maintenance. We think that to obtain these results rather slight increases in the weight of the engines than decreases are to be expected.

4 and 5. We do not think that improvement of the fuels as to the anti-knock qualities will allow the manufacturers to increase the compression ratios much above the range now used as, especially on air-cooled engines. The problem of dissipating the waste heat is the limiting factor. In other words, only a certain cooling area can be provided for each cylinder and too high a compression ratio leads to the danger of the cylinder temperatures becoming too high if the engine is not operated extremely carefully.

6. We believe that there is a field for compression ignition type engines in the higher horsepower class, either for large transport planes or dirigibles where they are operated under almost constant load conditions by a crew of highly specialized engine mechanics.

7. This question is almost answered under No. 2. We do not think that in the very near future any novel cylinder arrangements will obtain great importance.

8. We feel that great strides will be made through the use of new materials and that improved materials will be one of the main elements in increasing the reliability of the engines. These materials will include special light and strong castings containing magnesium as a base; alloy steels with improved physical qualities; and the substitution of stampings and forgings for castings.

9. The question of engine mountings is really more an airplane manufacturers' problem, but from the studies we have made we think that the ring type mounting for radial engines is about as good as any other tried.

10. We do not think that any marked simplification or improvement in the accessory installation will take place as these installations are very simple on the modern air-cooled engines. The substitution of titeflex, or some other flexible metallic hose, for rubber as flexible joints in the "plumbing" improves that part of the plane.

11. We think that the division of the responsibilities between the airplane and the airplane engine designer will go through a slow evolution. The addition of the exhaust collectors to the engines and other accessories, which previously have not been furnished with the engines, seem to indicate that the engine designer will have to shoulder more and more the responsibility for everything on the plane more or less related to the power plant.

Bright Prospects for Liquid Cooling—Unit Power Plants—Better Fuels

By ARTHUR NUTT
Chief Engineer, Motor Division, Curtiss Aeroplane & Motor Co.

NATURALLY, WE FEEL that liquid-cooled engines will be used in the near future in larger quantities. This seems to be the general tendency in England and in some of the European countries as well. There is no question that during the next year that the air-cooled radial engine will continue to predominate, as there are more of this type of engine in the smaller sizes. There will be, I believe, a progressive development in in-line air-cooled engines, but just how far this development will go it is impossible to state at this time.

Arthur Nutt

I am of the opinion that the difficulties in the use of reduction gears which are very necessary will be greater with the in-line type than they are with the radial, and this one feature alone may slow down the development of the Vee in-line engine. The direct drive in-line vertical or inverted engines will be used much more during the next year. With proper care there is no question that the period between overhauls can be very substantially increased, particularly if the operator and airplane designer will realize that a few more pounds in weight means very many more hours of operation.

Unless better fuels are made available, it is not possible to increase the compression ratio of the present four-cycle aircraft engine. I am very much in favor of improving fuels and having a universal distribution of a standard fuel.

I can see no immediate practical application of the compression ignition type of engine for aircraft use, owing to the fact that there are many complications introduced which have not yet been made practical. I do not look to the introduction of many new types of engines.

In reference to the cylinder arrangements, although there are a few untried arrangements which some designer may think have merits enough to try out experimentally (I refer to such engines in the small sizes as the double opposed six-cylinder), these types have all been considered by our Engineering Department and discarded in favor of those engines which we have produced up to date. There should be an increased use of light materials such as magnesium.

The use of forged cylinder heads of duralumin or "Y" alloy does not appear to be necessary in this country owing to the fact that the foundry practice on castings is very good. It is impossible to answer this question in any detail without taking up a great deal of space.

With proper co-operation, I believe that the engine mount and engine, in fact, the whole installation, could be built as a unit, relieving the airplane designer of a great deal of detail, and eliminating many troubles in service which come from improper installation. Such an arrangement would mean the simplification of all connecting controls and tubes such as oil and gasoline tubes.

Further contributions to this symposium will appear in next week's issue.

GENERAL NEWS

HERBERT F. POWELL, *News Editor*

HIGH POINTS in the NEWS

▶ *Planes and motorcycles.* Second New York American Legion Aviation Show closed Feb. 15, after more than 150,000 persons had paid to see exhibits of approximately 150 exhibitors, which included 41 planes (a premiere for seven of them), 34 motorcycles, vacuum cleaners, etc.

▶ *Show of shows.* Name: Second International Aircraft Exposition. Producer: Aeronautical Chamber of Commerce. Time: Feb. 15-23. Place: St. Louis Arena. Cast: 87 planes (initial appearance for a score of them), parts, and accessories. Opening was attended by eighteen to twenty thousand. Barney Zimmerly's record-breaking light plane altitude flight featured the second performance. Showings punctuated by price reduction announcements.

▶ *Moore and better.* New light plane speed record is established by Willfred G. Moore over 100 km. course at Kansas City. He flies an Inland Sport at the rate of 126.95 m.p.h., taking the crown away from A. S. Butler, England.

▶ *Michigan draws 'em up.* State Board of Aeronautics follows Department of Commerce regulations in formulating code for state supervision of pilots, aircraft, and airports, effective March 1.

▶ *Still the Army's.* Following conferences between Army and Navy boards, it is decided the Army will keep control of Coastal Defenses. It's been the Army's business for 150 years, they say.

Air Mail

▶ *Congressional objections.* Extension of the Postmaster General's air mail powers and a new basis of payment for contractors, as set forth in Representative Watres' bill, meets House opposition.

Foreign

▶ *For the next ten years.* Spanish government agrees to grant an annual subsidy of not less than $187,500 to Compania de Lineas Aereas Subvencionadas for the next decade and not to so aid any other line. In return, the subsidized firm agrees to operate certain routes.

▶ *The Chinese situation.* Reasons for a one-day suspension on Dec. 16, of the Nanking-Shanghai line operated by China Airways, a Curtiss-Wright subsidiary, have not been fully explained, it seems. Some want native line.

Seven Planes Make Debut at New York Legion Show

Burnelli 18-Passenger Transport Outstanding Among 41 Machines Displayed at Exhibit

NEW YORK (N. Y.)—With a large final day attendance bringing the total paid admissions to well over 150,000, the American Legion's Second Annual New York Aviation Show in the Grand Central Palace closed Saturday evening, Feb. 15, after a run of nine days. Exhibitors totalled approximately 150, with 41 planes on display, seven of which were being shown for the first time. Several gliders were also shown. Outstanding in the exhibition was the representation of the Uppercu-Burnelli and Aeromarine Klemm interests which displayed the new 18-passenger Burnelli transport, the Guggenheim contest Burnelli, and three Aeromarine Klemms, including the amphibion machine with wheeled floats. Baron von Warthausen's 'round-the-world Klemm Daimler plane was also shown. The Burnelli transport and Travel Air monoplane excepted, this show served to give the New York public some idea of the light land plane, light amphibion, and glider fields. Visitors, too, were able to compare these craft with a wartime Fokker D-7 and a British S.E. 5 being displayed by a film company.

A Douglas O-17 and Curtiss O1-E Falcon were also on display to represent modern military practice. The fastest plane of the show was the special Laird exhibited by Frederick Becker.

Aside from the planes and gliders, interest centered on such exhibits as the very comprehensive New York *Times* display on famous flights and the Antarctic expedition, the graphic representation by Airport Lighting, Inc., of Gross Ile airport with miniature runway lights flashing on and off, and the Western Union Telegraph display showing the use of wire services in aviation. New York's youth found many features attractive in the numerous—really a l too numerous—model planes, the flyin; toys, and the dime-in-the-slot machines of an amusement device manufacturer. These were copies of the Curtiss company's model wind tunnel and plane apparatus allowing one to grasp the stick and test one's ability at piloting.

Non-Aero Products Intrude

Detracting from the aeronautical impressions were several exhibits having little if anything to do with aviation. There were, for example, 34 motorcycles on display—only seven less than the total number of planes. Moreover, there were electric ice boxes and vacuum sweepers, which, we feel, do not depend enough upon the element of air to merit their display in an aviation show.

With but few exceptions, the actual

(Concluded on next page)

In Idea, Right; In Wings, Wrong

HOUSTON (TEX.)—When Haywood Nelms, official of Southwest Air Services, this city, read about the formation of a "flying squadron" at Edinburg, Tex., he thought it would be a good idea to send a Waco plane over for demonstration. He wired Edinburgh accordingly and received the following reply:

"Thanks for your interest in our organization. We beg to advise you that our ultimate goal is wings, yet we have much ground work to do before we can hope to do solo flying. Our organization is for spiritual rather than material purposes."

Weeks Firm Elects Officers

MILWAUKEE (WIS.) — Ralph N. Weil has been appointed sales manager of the Weeks Aircraft Corp. in line with a program of expansion recently inaugurated by the company. At the annual meeting of the firm, Elling O. Weeks was re-elected president. August Pabst was elected vice-president, Walter F. Mayer, secretary; and Eric E. Meyer, treasurer. These officers and Eugene Wald, Irving C. Buntman, and Clyde Hunspeth compose the board of directors. An extensive advertising campaign for Weeks is being handled by Klau-Van Pietersom-Dunlap-Younggreen, of this city. It is stated that more than 100 students are enrolled in the Weeks school, the ground course of which is conducted at 373 Eleventh Street. The Milwaukee County Airport is the scene of flight instruction.

Seven Planes Make Debut At N. Y. Legion Show

(*Concluded from page* 391)

manufacturers of the aircraft on display were not entered in the show because of the fact that it held no sanction from the Aeronautical Chamber of Commerce, that body having sponsored a New York show in Madison Square Garden, from May 3-10.

Seven airplanes had their debut at the show. The Liore et Olivier "Avileo" hydro-monoplane, one of which has been used for the ship-to-shore mail flown from the *Ile de France,* was displayed for the first time in this country. The Avileo Airplane Corp., with offices located at 230 Park Avenue, New York City, has been incorporated to manufacture the plane here. The plane is a single engine, pusher type, flying boat seating two passengers. The wings are cantilever in construction and may be demounted or rigged in a very short time. A Salmson engine of 120 hp. gives the craft a cruising speed of 89 m.p.h. The machine should find use in this country for both training and sport purposes.

The Gee Bee biplane had its first showing here. Four of these planes have been completed and production is under way. This plane is a side-by-side, two-place, open cockpit biplane powered with a Kinner. The plane has many novel features which will be described in an early issue of AVIATION.

Above is a view of the main floor of the New York show. The front portion of the Savoia-Marchetti S-56 light amphibion may be noted in the foreground, while the French Liore et Olivier "Avileo" flying boat is shown beyond. The Ninety-Nine Club's Travel Air monoplane is in the background to the left, and the special Air-Istocrat low-wing machine is adjacent

Cairns All-Metal Craft on View

The Cairns monoplane, which has been the subject of many rumors from Connecticut of late, proved interesting. This plane is of all metal construction using no corrugated sheets at any place on either wings or fuselage. Ribs, wing fittings, and fuselage bracer are of die cast aluminum alloy. The fuselage is of monocoque metal construction. Only three sheets of dural are used to fabricate the entire fuselage. In cross section it is somewhat like a triangle with the vertex to the top. The two upper sides are rounded to give better streamlining.

The eighteen-passenger Burnelli plane was rushed to completion in order to be shown at the Palace. The plane is powered with two 625 hp. Wright Tornado engines, and test flights, when it is completed, should prove of interest. The interior of the cabin is very well outfitted. Head room, however, was at a premium.

Air-Istocrat Racer Exhibited

The Air-istocrat low-wing monoplane on exhibit at the show was built by the United States Aircraft Co., of New Jersey, as a custom-built racing plane. This plane was rushed to completion in order to be exhibited at the show and hence has not been test flown. Built on much the lines of the Travel Air "S," it seems to have a very high power loading and a consequent high landing speed.

The Twentieth Century two-place tandem monoplane had a fuselage reminding one of the Cairns. It is of monocoque construction and roughly triangular in cross section, the vertex, however, being toward the ground. The plane is powered with a Kinner engine and is priced at $4,500.

New to air shows was the Aeromarine amphibion, with wheels installed in the floats. This craft had folding wings and is powered with the inverted Rover engine.

Fiats in Engine Display

In the engine line, Fiat Motors exhibited two aircraft and one marine engine. The Fiat company is endeavoring to find an American representative for the manufacture of these plants. Both a radial air-cooled and a water-cooled Vee type engine for aircraft were shown. The company claimed 1,000 hp. for the water-cooled engine which weighed 760 lb. Without definite data on which to base our statement this seems highly optimistic. The Wright-Tuttle Aircraft Motors Corp., Anderson, Ind., exhibited a five cylinder, radial, air-cooled engine. The engine is built under a license from Renard Aviation and Motor Co., Belgium. Other engines were exhibited by the Estey-Reid Aircraft Sales Co., National Aircraft Corp., Kimball Aircraft Corp., and Szekely Aircraft and Engine Co.

Following is a list of the exhibitors and the products exhibited, exclusive of motorcycles, vacuum cleaners, refrigerators, and models: Aeromarine Klemm Corp., Aeromarine Klemm monoplane and amphibian; Avileo Airplane Corp., Liore et Olivier French "Avileo" hydro-monoplane Frederick Becker, Eastern Distributor, special Laird biplane; Brunner-Winkle Aircraft Corp., two Bird biplanes; Cairns Aircraft Corp., Cairns monoplane; Estey-Reid Aircraft Sales Co., Flying Dutchman; Gates Aircraft Corp., R S V monoplane and biplane; General Airplanes Corp., Aristocrat monoplane; LaRoe Airways, Inc., Eaglerock Bullet; Walter J. Masterson, Jr., Whittelsey Avian biplane; *Morning Telegraph,* Bellanca Pacemaker; New York National Guard, Consolidated 0-17; New Standard Aircraft Corp., New Standard biplane; Ninety-Nine Club, Travel Air monoplane; Police Department, City of New York, Savoia-Marchetti amphibion; C. T. Stork Corp., Savoia-Marchetti S-56 amphibion and Great Lakes Sport Trainer; U. S. Army Air Corps., Curtis Falson 01-E; Uppercu-Burnelli Aircraft Co., eighteen-passenger Burnelli all-metal monoplane and Burnelli twin-engined Guggenheim contest monoplane; Harry Day, Arrow Pursuit; Gorman Bros., Barling NB-3 monoplane; Granville Bros. Aircraft, Inc., Gee Bee biplane; Institution of Aeronautics, New Standard; Prof. Alfred G. Leigh, Ford-Leigh Guggenheim Contest entrant; National Aircraft Co., Air Cub; Ridgeood Aircraft Corp., Swallow Training plane; Twentieth Century Aircraft Co., Twentieth Century plane; United States Aircraft Co., of N. J., Air-istocrat monoplane and biplane; American Motorless Aviation Corp., gliders, primary, secondary and soaring; American Sailplane Co., glider; Aviation Engineering School, school plane; Caddo Co., Inc., Fokker German D-7 War plane and S. E. 5 English War plane; Baron von Warthausen, Klemm-Daimler 'round-the-world plane.

Other Firms Participating

Among other exhibitions were the following: Airport Lighting, Inc., Robert Bosch Magneto Co., Inc., Claude Neon Lights, Inc., Electro Products Co., Estey-Reid Aircraft Sales Co., Fiat Motors, Kimball Aircraft Corp., New York Lubricant Co., Major Aircraft Corp., Paramount Welded Aluminum Products Corp., Richfield Oil Corp. of New York, Smith Aviation Equipment Co., Westinghouse Electric & Mfg. Co., Western Union Telegraph Co. (relation of wire service to aviation), New York *Times* (graphic portrayal of the Byrd Expedition to the Antarctic and of famous flights), U. S. Post Office (National Air Routes), U. S. Navy, Department of Agriculture, Air Transport & Equipment Co., American Museum of Natural History, Sidney Blumenthal & Co., Inc., Clersite Co., Curran Machine Works, The Fleischmann Transportation Co., Gloversville Knitting Co., Galena Oil Co., Institution of Aeronautics, Inc., Henry Klein & Co., E. Leitz, Inc., Pittsburgh Plate Glass Co., Pyrene Manufacturing Co., E. S. Ritchie & Sons, W. J. Savage Co., Granville Smith, Triplex Safety Glass Co., Walker Cement Products, Inc., Whittemore-Sim Co., Inc., and Kelvin & Wilfrid O. White.

N. Y. U. Presents Series Of Seven Air Law Talks

NEW YORK (N. Y.)—Tuesday, Feb. 18, a series of seven lectures treating various legal aspects of aviation was begun under the auspices of the school of Law, New York University. The course, to be held on successive Tuesday evenings until completed, will be handled by well-known authorities versed in different branches of aeronautics and aviation law.

Prof. Alison Reppy will have charge of the meetings, which are to be held in the auditorium of the recently completed education building. Cards of admission may be secured from the New York University School of Law, 100 Washington Square East.

"The series," said Dean Frank H. Sommer, "grows out of research in air law carried on in the school during the past year, and incidental contacts with attorneys representing the aviation industry. Such research and contacts brought many novel and perplexing legal problems, some of which involve burning issues, to the forefront of discussion and consideration.

To Offer Basis for Progress

"The solving of these problems—the sound resolving of these issues—requires an enlightened interpretation of precedents of an earlier and different day and the adapting them to new conditions. It also requires intelligently considered legislation, co-ordinating law with fact. The series is offered to forward and advance the orderly development of the law in this field and to lay a foundation for enlightened interpretation and adaptation of precedents and intelligent legislation."

Henry G. Hotchkiss, member of the firm, Cuthell, Hotchkiss and Mills, one of the editors of "Aviation Reports", and author of a text on aviation law, will launch the series Feb. 18, with his lecture on "The Origin, Development, and Present Status of Aviation Law."

Manley O. Hudson, an expert on International Law, professor of, and holder of, the Bemis Chair of International Law, at Harvard University, will speak Feb. 25 on "Aviation and International Law."

Bouve on "Property Rights"

Clement L. Bouve is agent of the United States before the General and Special Claims Commission, United States and Mexico, a member of the bar, District of Columbia, and has contributed many legal articles on aviation and international law. He is also a member of the aviation board of the Air Law Review. He will talk March 4, on "Property Rights in Air Space."

Arnold W. Knauth will deliver, on March 11, the fourth lecture of the series on the subject of "Aviation Liability and Insurance." Mr. Knauth is closely connected with aviation insurance and is an editor of "Aviation Reports."

Mabel Walker Willebrandt, general counsel of the Aviation Corporation, and a member of the standing committee on Aviation Law of the American Bar Association, will discuss "Federal and State Regulation of Airways" on March 18.

William P. McCracken, Jr., former Assistant Secretary of Commerce for Aeronautics, and recently appointed Chairman of the New York, Rio and Buenos Aires Line, secretary of the American Bar Association, and a member of the association's standing committee on aviation law, will talk March 25, on "The Application and Enforcement of the 1926 Air Commerce Act."

Chester W. Cuthell will bring the series to a close on April 1. He is the senior member of the firm of Cuthell, Hotchkiss and Mills, general attorney for the Curtiss-Wright Corp., and also chairman of the standing committee on aviation law of the American Bar Association. His topic will be "Federal and State Aviation Law."

Hunting Feature Added to Fishing

TAMPA (FLA.)—". . . And they fished and fished until they became exhausted from pulling in the catches."

So reads the tale of a group of fishermen who, while flying over a section of the Gulf of Mexico recently in a Keystone-Loening Amphibian, located a school of fish, dropped down in its midst, and flung in their lines.

Reports have it that school-of-fish fishing bids fair to become a popular Florida sport.

Aero Firm Renews Dealership

LOS ANGELES (CALIF.)—Contracts have been signed by the Aero Corporation of California for the renewal of its dealership franchise on Consolidated Fleet planes for the year 1930. Signing of the contract was accompanied by an order for three new Kinner Fleet training planes to be delivered to the Standard Flying Schools, a subsidiary of the Aero Corporation, now using a group of five Fleet trainers. Standard Flying Schools has also taken delivery on a new four-place Monocoach.

Cessna Elects Officers

WICHITA (KAN.)—Clyde V. Cessna has again been elected president of Cessna Aircraft Co. Other officers are Hugo Kenyon, banker, vice-president; Eldon Cessna, secretary; W. B. Harrison, treasurer; and James Verts, assistant secretary. William Priest and L. B. Rogers are on the board

St. Louis Show Exhibits 87 Craft

Price Cuts and Light Plane Record Feature Opening Days

ST. LOUIS (MO.)—Establishment of a world's record, price reduction announcements, and the initial exhibition of a score of new craft were highlights of the opening days of the second International Aircraft Show which started here in the recently completed $3,000,000 Arena on Feb. 15.

Barney Zimmerly, Marshall, Mo., established the record when he piloted a Barling NB-3 to an altitude of approximately 27,500 ft. to beat the former light plane altitude record of 22,250 ft., made by Paul Baumer, Germany, on July 8, 1927.

It was estimated some 20,000 persons were on hand at Lambert Field when Zimmerly landed after having been aloft two hours and encountered a temperature of 32 deg. below zero in bringing the record back to this country. He carried two bottles of oxygen and other high-altitude equipment. His flight which started from the temporary field near the Arena was watched by Luke Christopher, N.A.A. official, who sent the two barographs to Washington for official calibration, after averaged first readings resulted in a figure of approximately 27,500 ft.

Holds Another Record

Zimmerly's 90-hp. Lambert-engined craft, which weighs 735 lb., was well under the weight limit for light planes which is 800 lb. Last year, Zimmerly established a light plane distance record by flying a Barling from Texas to Canada on a non-stop flight, a distance of 1,650 mi.

Manufacturers announcing price reductions at the show include: Stinson Aircraft Corp., Great Lakes Aircraft Corp., and Command-Aire, Inc. The first firm said the price of its four-place Stinson Junior would be $5,775, one of which craft is now on exhibition here for its first public appearance and incorporates such equipment as an electric self-starter, dual control, soundproof, heated, and ventilated cabin; adjustable steel propeller, brakes, hydraulic shock absorbers, and luxurious interior fittings.

Great Lakes Price Down

Col. Benjamin F. Castle, president of Great Lakes Aircraft Corp., said that the company's Trainer would hereafter sell for $3,150 instead of $4,990. The Arrow Tangerine making its first public bow here, will be marketed at $3,535 according to its builders, Arrow Aircraft & Motors Corp.

The eighty-seven planes being shown here drew a crowd estimated between eighteen and twenty thousand on the opening day. This number included

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Michigan Ready With State Code

Board of Aeronautics Drafts Rules to Take Effect March 1

LANSING (MICH.)—The Board of Aeronautics of the State of Michigan, created by the 1929 Legislature, and headed by William B. Mayo of Detroit, chairman, and Capt. Ray Collins of Detroit, director, has passed rules and regulations governing all aircraft activity in Michigan, excepting airplane factory production.

The new rules and regulations deal chiefly for the present with controlling aircraft schools and airports—the main purpose being to encourage the construction of new fields, and to protect the student enrolling in an aircraft school.

Hereafter it will be unlawful for any aeronautical school in Michigan to operate without a license from the Board of Aeronautics. The issuance of a license to a school entitles the board to direct the management and course program and in this manner, the new Michigan Board expects to protect the air-minded student against fraudulent schools.

License Fees for Schools

Schools will be listed as follows: Transport Pilot school, license fee, $100; Limited Commercial Pilot school, license fee, $50; Private Pilot school, license fee, $10; aviation ground school, license fee, $10.

The various courses must be completed within the following periods of time: Private, four months; Limited Commercial, six months; and Transport, eighteen months. All students must be instructed in the use of parachutes of the type approved by the Department of Commerce and must be equipped with chutes during flight instruction.

Provisions for Instructors

The law also provides that only Transport Pilots can be used in these schools as flight instructors, and they, too, must be licensed by the state before being allowed to operate as flight instructors in Michigan.

Students learning to fly in Michigan are not, under the new laws, to be soloed until they have had at least eight hours of dual flight instruction.

The Michigan laws have deviated only slightly from those of the Department of Commerce, several of the deviations being:

(a)—that a Private Pilot cannot instruct under any circumstances, (it is hoped this will eliminate the "friendship flying.")

(b)—that the violator can be given a jail sentence as well as a civil monetary fine.

(c)—that the school or club must have one plane in operating condition for each fifteen students enrolled in the plane school for flight instruction.

(d)—that only approved planes can be used.

(e)—that a private pilot, hereafter, while flying in Michigan, cannot carry more than three passengers, excluding himself, and the Limited Commercial and Industrial Pilot is limited to carrying five passengers excluding himself.

All airports and landing fields in Michigan will be classified in strict accordance to the rules of the Department of Commerce, and all flying activity throughout the state must be carried on from a licensed airport. The airport must name an airport manager who will be licensed by the state and be responsible to the state for the condition of his home port. The airport manager must also cooperate with the Board in investigating air accidents.

Any pilot operating from an unlicensed airport or landing field will be subject to a fine of $100.00 and a 90-day jail sentence. This penalty also applies to the owner or operator of an airport, landing field, school, club or instructor who is found to be operating without a license, or one revoked or suspended.

Stipulate Penalties

In violating any of the provisions stated in the acts covering licensing and air traffic, school, or airport regulations, the person or persons are punishable by a fine not exceeding one hundred dollars, by imprisonment of not more than ninety days, or both.

The board of aeronautics will employ several inspectors who will tour the state continuously and in conjunction have the cooperation of the state police in checking crashes and eliminating and reporting the barnstormer who is operating from the roadside.

The Board has offices in the Union Trust Building in Detroit, and in the Capital National Bank Building in Lansing, which is the main office.

Flying Clinic Completes Tour

MIAMI (FLA.) — A seventeen day plane tour covering 14,000 mi. in South and Central American countries has been completed by the flying clinic, a group of five American surgeons and physicians. After the first part of the trip, the doctors stopped at Panama for the Pan-American Medical Association conference, held Jan. 30-Feb. 3, and then continued their tour which called for stops in sixteen principal cities of Latin America. Those comprising the group were: Dr. William Sharpe, president of the Pan-American Hospital and Clinics, New York; Dr. Fred H. Albee, consultant for bone surgery at the same institution; Dr. Arnold H. Kegel, Health Commissioner of Chicago; Dr. Charles Gratz, director of the Pan-American Bone Fracture and Orthopedic Clinic, New York; and Dr. George W. Hawley, a bone surgery specialist of Bridgeport, Conn. In speaking of eradicating flies and mosquitoes in certain of the countries visited, Dr. Kegel said a solution dropped from a plane could wipe out the pests in a 25 mi. square area in five weeks, with two applications per week costing about twenty dollars.

Contemplate Dissolution Of Airstocks, Inc., Firm

NEW YORK (N. Y.)—White, Weld and Company, holders of 47,076 shares of 86,257 shares outstanding of Airstocks, Inc., an air investment firm, plan to liquidate their holdings, according to an announcement made co-incident with the first annual report of Airstocks. These shares were acquired by the White concern through purchase in the open market and exercise of options.

Airstocks, Inc., should be liquidated, assert the bankers, and a pro rata distribution of the cash results be made to stockholders. The market value of the stock on Dec. 31, was $46.34 per share while at the present it is worth approximately $46.85 a share.

In its report, Airstocks, Inc., showed a net income after expenses and taxes of $293,842 for the period from Jan. 15, 1929, to Dec. 31, or equivalent to $3.28 per share on outstanding capital stock at the year's close. The earned surplus amounted to $204,003 after a special dividend of $1 per share was made on Jan. 2.

Total assets of the firm amount to $4,329,769, of which $3,681,112 is cash, and investments at cost total $629,648. Liabilities are listed as amounting to $94,171, leaving net assets of $4,235,598.

A letter has been sent out to Voting Trust Certificate holders, urging dissolution, and the board of directors and voting trustees have taken steps to have the company dissolved, it is stated. Plans are being made to make the cash from stocks available to stockholders not later than March 7.

There is a newspaper report current as AVIATION goes to press that the Pittsburgh Bond and Share Corp. has made an offer whereby holders of Airstock shares in western Pennsylvania may exchange their stock for Pittsburgh Bond stock, share for share, until Feb. 28. Stock of the Pittsburgh firm is quoted at $48.05 per share as of Feb. 11.

Peru Orders 26 Vought Corsairs

HARTFORD (CONN.)—According to a United Press despatch, the Peruvian government has ordered 26 Vought Corsairs. The contract is said to have been placed when Frank W. Love, president of United Aircraft and Transport Corp., was in Lima, Peru recently. He is now on his way back to the states vi. Pan American Grace and Pan American Airways.

Erratum

In the article "Mergers and Consolidations in the Industry," page 153, AVIATION, Jan. 25, Lincoln Aircraft Co. was erroneously listed as an American Eagle Aircraft Corp. subsidiary. Both the American Eagle and Lincoln firms have advised us that there is no financial connection between the organizations, nor any affiliation other than a friendly and cooperative spirit—Ed.

Lindbergh's Lockheed Undergoes Modifications

LOS ANGELES (CALIF.)—Final delivery of Col. Charles A. Lindbergh's new Lockheed "Sirius" low-wing monoplane has been postponed pending completion of minor improvements suggested by Lindbergh.

Flight tests were recently made following installation of a detachable cabin enclosure (pictured in AVIATION, Feb. 15), which is said to add approximately 9 m.p.h. to the top speed of the craft. The seat in each cockpit has been made adjustable so that the seats can be dropped approximately 6 in. when the hatches are closed.

A further improvement has been the mounting of a Schenk gyroscope pendulum, or gyro-pendulum, which was installed to augment the set of blind flying instruments. This instrument has an indicator finger rising vertically from a bowl shaped container and indicates on a glass covering which is marked off in circles and bisecting lines through its center. The finger is held to a vertical position through the action of a wind driven gyroscope and constantly indicates the true attitude of the plane with respect to the three axes. The instrument is mounted forward of the control stick at about knee level. It was first tested by Lieut. Harold Bromley in his trans-Pacific plane of 1929.

A further innovation is now being installed on the "Sirius" under the utmost secrecy, but it is rumored to be a retractable landing gear completely eliminating all parasite resistance chargeable to an auxiliary unit of the plane.

According to a recent announcement, Lindbergh is planning a series of high altitude test flights with the Lockheed, flying to heights of 15,000 to 20,000 ft. in order to determine the practicability of operating transport aircraft above the storm-cloud areas. It is said these experiments will be conducted in cooperation with naval meteorological experts at Lakehurst, N. J.

Boeing Develops New Welder

SEATTLE (WASH.)—Boeing Airplane Co., which is an extensive user of electric arc welding in steel structural assembly work, has developed a low voltage, low amperage, AC arc welder that permits the welding of tubing and sheet stock ranging from .035 in. to .375 in. in thickness. DC welding sets are also used. Fuselages, landing gears, and other steel structures are assmbled by arc welding while torch welding is used to a limited degree in small sub-assembly work.

Canadian Boeing Offers Repairs

VANCOUVER (B. C.)—In addition to building planes here, Boeing Aircraft of Canada, Ltd., is engaging in general repair work. Four different types of planes are now being overhauled.

Test "Flying Wing"

TEST FLIGHTS were recently made on the Northrup Aircraft firm's unique all-metal two-place "flying wing," depicted above in flight over the Northrup factory at Burbank, Calif. The dimensions of this initial craft are: span, 30 ft. 6 in.; length, 20 ft.; height, 5 ft.; and wing area, 184 sq.ft. In pusher arrangement, a Mark III Cirrus engine, especially inverted by Menasco Motors, Inc., actuates the propeller through a tubular steel drive shaft.

St. Louis Show Opens

(*Concluded from page* 393)

several thousand school children and Boy Scouts who were allowed a preview of the exhibit. According to Cliff Henderson, manager of the show, the aircraft, parts and accessories housed in the three buildings are worth approximately $2,500,000.

Curtiss-Wright and its thirteen subsidiary companies have the largest group of planes on exhibit, having fifteen craft which number includes the $100,000 Guggenheim Safe Aircraft Contest winner, the "Tanager." Another large display is that offered by the Detroit Aircraft Corp., with eight planes in its section.

Of great importance to the industry and those in it are the various meetings taking place here under the auspices of the Aeronautical Chamber of Commerce, the Aeronautics Branch, Department of Commerce; the Society of Automotive Engineers; and the Daniel Guggenheim Fund.

Fokker officials at the show announced they had received word of a contract signed with the Nippon Air Transport Co., of Japan. Prior to completing arrangements for the manufacture of Fokkers in Japan, the Passaic, N. J., and Teterboro, N. J., factories will build five Wasp-powered Super-Universals for shipment to the Orient to be added to the 21 Fokkers—now in service there.

[AVIATION will carry full details of the show in the March 1 issue.]

Army Retains Control Of Coast Defense Units

WASHINGTON (D. C.)—An agreement finally reached between Army and Navy authorities gives the former entire control of coast defenses, including aircraft, a report from here reveals. Conferences between boards of the Army and Navy, aided by a joint Congressional commission in charge of Senator Bingham, president of the N.A.A., had been held over a long period of time, but the conclusions were not immediately shaped for use.

The announcement of the settlement of this problem came with the word that the War Department is making plans for the establishment of a new anti-aircraft unit at Aberdeen, Md. As agreed upon, the Army will have charge of both defensive and offensive anti-aircraft operations and the manipulation of planes at coastal bases. Under a reorganization of the Coast Artillery Corps taking place, training activities will be centered at Long Island Sound, Chesapeake Bay, Pensacola, Fla., and Puget Sound.

Included in the coast defense posts turned over to the army are those at Portland, Me.; Portsmouth, N. H.; Boston and New Bedford, Mass.; Narragansett Bay, Eastern New York, Southern New York, Delaware River, Potomac River, Charleston, S. C.; Savannah, Ga.; Key West, and Tampa, Fla.; Mobile Bay, Galveston, Tex.; San Diego and Los Angeles, Calif.; and the Columbia River.

Eight Coast Artillery regiments are to assume anti-aircraft duties, it is stated, and five harbor defense units will maintain a full force of from 300 to 500 men. Only skeleton crews will be left at some of the important gun centers so as to have more of the 6,395 Coast Artillery personnel available for anti-aircraft bases.

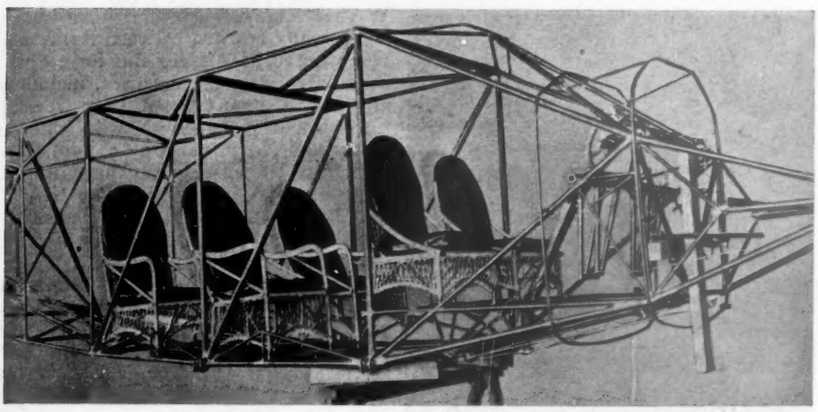
Thompson Earnings for 1929

CLEVELAND (OHIO) — Thompson Products, Inc., manufacturers of airplane and automobile parts, reports net earnings for 1929 of $1,231,235, equal to $4.58 per share on 263,160 shares of no par common stock to be outstanding upon completion of the exchange of present class A and B stock. This common stock was recently made available for trading on the floor of the New York Stock Exchange following approval by the listing committee. The earnings in 1928 amounted to $1,073,513, or $4.14 per share on A and B shares.

Revise Stinson Board

DETROIT (MICH.) — A recent announcement states that the revised board of directors of the Stinson Aircraft Corp., now numbering but five, is as follows: E. L. Cord, chairman; Edward A. Stinson: W. A. Mara; Raymond S. Pruitt; and L. B. Manning.

Special Chair Installation Used on "Osprey"



SUPPORT OF CHAIRS entirely independent of the cabin flooring is obtained by a special mounting developed by the Ogden Aircraft Corp., Los Angeles, for its "Osprey" six-place tri-engined plane. Specially trussed members are employed to carry the chair loads direct to the primary fuselage structure, and a lighter flooring is thereby permitted.

Plan 20,000-Mi. Tour In Prudden-Whitehead

ATLANTA (GA.)—A 20,000-mi. tour is planned for the first Prudden-Whitehead plane recently turned out from the plant of the Atlanta Aircraft Co. here.

The first lap of the tour will be from Atlanta to Miami. From there the plane is scheduled to fly to Havana, Cuba; thence to British Honduras, Nicaragua, and Panama; then down the West Coast through Colombia, Ecuador, Peru, Chile, and Argentina; and finally back north through Paraguay, Uruguay, Brazil, and French and British Guiana.

Fourteen countries will be touched on the trip, it is stated, and the plane will be given a practical test under all flying conditions.

Those making the trip will be Edward Whitehead, vice-president of the Atlanta Aircraft Co.; Lt. John Best, United States Navy pilot, who has been conducting the test flights for the company, and other mechanics and pilots from the staff of the firm.

Bendix Absorbs Bragg-Kliesrath

LONG ISLAND CITY (N. Y.)—Bragg-Kliesrath Corp., manufacturer of the B-K booster brake for airplanes and automobiles, has been absorbed by Bendix Aviation Corp., officials announce. Production will continue at the Bragg-Kliesrath factory here, but some of the larger orders will be handled by the Bendix plant at South Bend, Ind. Caleb S. Bragg will continue as president of the firm, and V. W. Kliesrath as vice-president and general manager. Vincent Bendix, president of Bendix Aviation Corp., and Charles Marcus, president of the Eclipse Aviation Corp., another Bendix interest, will be added to the Bragg-Kliesrath board.

Approve Plane, Engine, Pontoons

WASHINGTON (D. C.)—Approved type certificate No. 294 has been awarded the Stinson SM-8B, four-place closed monoplane, powered with a Wright J6-7 engine, weighing 2,063 lb. empty and 3,200 lb. fully loaded with a useful load of 1,137 lb. Approved type engine certificate No. 42, has been issued the Lycoming R-680, a nine-cylinder, radial, air-cooled power plant, producing 215 hp. at 2,000 r.p.m. Great Lakes pontoons, model 1334, two to a plane, and capable of supporting a maximum weight of 13,500 lb., have been approved for use on licensed aircraft.

Air Education to be Discussed

NEW YORK (N. Y.)—Wednesday, Feb. 26, 2:15 p.m., a meeting will be held at the Ambassador Hotel under the auspices of the Daniel Guggenheim Fund Committee on Elementary and Secondary Aeronautical Education in connection with the annual conference of the Department of Superintendence of the National Education Association. The following persons will speak on the following subjects: Dr. John W Withers, chairman of the Guggenheim Committee, "Progress in Aeronautical Education in the Public Schools During 1929"; Roland H. Spaulding, a specialist on the Guggenheim Committee, "Method of Procedure in Securing a Teaching Staff and Equipment, and in Building a Curriculum for Aeronautical Instruction in the Public Schools"; Amelia Earhart, assistant to General Traffic Manager, T.A.T., "School Girls and Their Relationship to Aeronautical Education"; William P. MacCracken, Jr., chairman of the New York, Rio and Buenos Aires Line board of directors, "Public School Aeronautical Education from the Standpoint of the Aviation Industry."

Huntington Firm Buys Plant Near Bridgeport

BRIDGEPORT (CONN.)—Huntington Aircraft Corp. has purchased a two-story factory building and several adjoining acres of dock property on the Housatonic River in Stratford, a suburb. The property was bought from George B. Clark, realtor, for $60,000, of which $35,000 was represented by a mortgage.

The factory building contains about 12,000 ft. of floor space and the interior is being remodelled to suit the manufacturing needs of the Huntington company. Howard Huntington, president, announces that a small amphibion, designed by himself and George Titterton, chief engineer, will be manufactured. At present the Huntington concern has a two-place cabin monoplane under construction by contract at the plant of the Olsen Aircraft Co., officials of the concern state.

In addition to possessing the advantages of 1,000 ft. of waterfront, with a channel 20 ft. deep, the new Huntington plant will eventually be located within a stone's throw of the Boston Post Road, which is to be carried past the factory on a cut-off. Planes built by the company can be launched direct from the plant. The factory is a half-mile distant from that of the Sikorsky Aviation Corp.

Shell Buys Five Planes

ST. LOUIS (MO.)—Purchase of five new airplanes as the first step in a program of commercial aviation promotion, has been announced by F. M. Schlegel, manager of the Shell Petroleum Corp. This purchase closely follows the appointment of Lieut. James M. Doolittle as director of the aviation department for the oil company, and Capt. John A. Macready, in charge of aviation activities on the Pacific Coast. The five planes purchased include a Lockheed-Vega recently delivered to Lieutenant Doolittle (and recently damaged in a take-off), a Lockheed Sirius of low-wing type, a Timm training plane, Stearman mail plane, and Travel Air Mystery plane. A staff of expert pilots is being organized to conduct the flying activities of the organization and much research work is to be devoted to the improvement of aviation fuels and lubricants and to the development of improved distribution and marketing facilities.

Navy Orders Nine Curtiss Craft

WASHINGTON (D. C.)—Nine fighting planes of the F8C-5 type, an adaptation of the Curtiss carrier type F8C-4 with the carrier features eliminated, are to be delivered to the Navy Department for the use of the Marine Corps. The Curtiss Aeroplane & Motor Co., Long Island, N. Y., is to furnish these nine two-place, Wasp-powered planes for $117,562.50, according to the contract figures.

Curtiss-Wright Students Numbered 1,361 in 1929

NEW YORK (N. Y.) — Statistics on Curtiss-Wright Flying Service schools for the past year show 1,361 active flying students were enrolled in regular courses for Department of Commerce licenses. They flew a total of 36,649 hr. 47 min., without a single fatality or an accident of major importance, the announcement continues.

"While such a record," said C. S. ("Casey") Jones, president, "is naturally especially gratifying to us, we believe that such figures have a more important bearing upon the present and future of commercial and private aviation in the United States than their relation to a single company would indicate.

"To begin with, these statistics indicate that more than 1,000 different students, both men and women, safely covered a distance by air transportation of approximately 3,000,000 mi. Since these students, by their very classification as such, represent novices exclusively, it would be difficult in the extreme to produce a more striking proof of the potential safety of aircraft in flight.

"On the whole, then, it is reasonable to hold the view that safe instruction is possible in any well organized and properly managed flying school and that almost any man, woman, or child of normal mentality and physique can learn to fly without the anticipation of danger with which the public has viewed aviation in the past."

Dr. Prandtl Lectures at M. I. T.

CAMBRIDGE (MASS.) — A series of four lectures on "Fluid Dynamics" were given at the Daniel Guggenheim Aeronautical Laboratory, Massachusetts Institute of Technology Feb. 13-18 by Dr. L. Prandtl, of the University of Göttingen, Germany. The titles of the papers by this leading authority on fluid dynamics were: "The Formation of Vortices in Fluids of Small Viscosity," "The Flow of Gases with Velocities above the Velocity of Sound," "The Laws of Turbulent Fluid Motions," and "The Molecular Theory of the Elastic Hysteresis and Plastic Flow."

Parks School Reports Business

EAST ST. LOUIS (ILL.)—During the month of January, business done in the sale of flying and mechanical courses offered by Parks Air College amounted to more than $155,000, the company states. Branch offices of the recently developed national direct sales force organized to sell aviation courses by personal contact, are located in Chicago, Ill.; Dallas, Tex.; Toledo, Ohio; Birmingham, Ala.; New York City, N. Y.; Denver, Colo.; and Louisville, Ky. Ernest M. Crosby, a Parks graduate, heads the national sales force.

Government Order for Vickers

OTTAWA (ONT.) — The Department of National Defence has ordered five flying boats of the Vancouver type from the Canadian Vickers Co., Montreal, at an approximate cost of $350,000. These will be used as replacements for obsolete flying equipment used in fire prevention work. The Vancouver type is a cabin biplane with a span of 70 ft.

Scott Concern Moves To Kalamazoo Airport

KALAMAZOO (MICH.) — New headquarters of the Scott Engineering Co., Kalamazoo, Mich., have just been established in a recently completed 60x100 ft. hangar on the Kalamazoo Municipal Airport. The building houses a completely equipped machine shop for the overhauling and rebuilding of power plants.

Harry A. Scott, chief engineer, will personally supervise all the overhaul and repair work done. There is a room in the hangar for the use of visiting pilots and passengers which is outfitted with all modern conveniences.

According to S. W. Cushman, president of the Scott firm, the company will operate a flying school, conduct a taxi service, and engage in the selling of planes and accessories. The concern is incorporated for $75,000.

Award N.A.C.A. Wind Tunnel Bid

WASHINGTON (D. C.)—To the J. A. Jones Co., which furnished the lowest estimate, has gone the bid for constructing the large new N.A.C.A. wind tunnel at Langley Field. The award made on Feb. 10, following reports of all bids being rejected, contains the condition that the device must be completed within 260 days after work is started. The Jones company figures were: $371,700 with Carey covering wood cones, $520,000 with Carey covering steel cones, and $404,200 with Carey covering gunite cones, with an additional $22,000 to be added if a built up roofing, wood deck is used instead of Careystone roof. Bids offered ranged from the Jones figures to $637,000. Others competing for the award were Hughes Foulkrod, Thurston Construction Co., Rust Engineering Co., Virginia Bridge & Iron Co., John W. Cowper, and W. P. Rose Co., which was granted the seaplane channel bid, as reported in AVIATION of Feb. 15.

Cut Price of Thermo-Petes

MOLINE (ILL.)—Aviation Accessories Corp., a division of Allied Aviation Industries, announces a reduction in prices of the Thermo-Pete, the new cost being $30 for the oil-heating device for installation on a radial type engine and $35 for a Thermo-Pete to be used on an OX-5 or sump type power plant. These changes in price will take effect immediately, declares G. E. Stange, president of Aviation Accessories.

Moore Betters Speed Mark for Light Planes

KANSAS CITY (MO.) — A new world's speed record for light airplanes carrying pilot and passenger was established Feb. 12, at the municipal airport here by Willfred G. Moore in his Inland Sport monoplane. Moore made a record of 126.95 m.p.h. over a 100-km. course, which was 7.15 m.p.h. faster than the former record set by A. S. Butler, of England, in 1928.

The flight was officially observed by Luke Christopher, secretary of the contest committee of the N. A. A. Moore's time over the course was 29 min., 22.4 sec. A stiff wind blew diagonally across his course during the flight and the air was extremely rough.

The machine used by Moore, which is manufactured by the Inland Aviation Corp., of Kansas City, is rated Class C, first category, for record attempts. The flight represented Moore's second attempt to better the world's speed record. Attempts in October by Moore to break existing altitude records fell short by 200 ft.

California Merger Effected

LOS ANGELES (CALIF.)—Merging of Continental Air Express and Commercial Aircraft Corp. under control of the Liberty Finance Corp. gives Los Angeles an affiliated airline and aircraft factory. Continental Air Express has operated a Los Angeles-Taft-Bakersfield and a Los Angeles-San Francisco air line for a number of months, using tri-engined equipment, while the Commercial Aircraft Corp. manufactures a six-place, single-engined, cabin biplane. Operations have been resumed at the Commercial factory with an initial pay roll of 20 men, and cabin biplanes are soon to be placed in service as auxiliary equipment on the Continental Air Express routes. Officers of the Liberty Finance Corp. are: E. K. Fleming, president; H. H. Pursel, vice-president; and M. G. Phillips, secretary. Directors include, in addition to the officers named: B. L. McCabe, N. W. Hacker, H. W. Baker, Harry Sperl, Sam E. Edwards, and Ralph Downer.

A.P.C. Skis Approved

DETROIT (MICH.) — Department of Commerce engineers have informally approved three types of skis manufactured by the Aircraft Products Corp., of this city, according to Ralph R. Irwin, president. "While the Department has not yet established a standard for an approved type certificate for skis," Mr. Irwin said, "it has agreed that our B type, J type, and S type are of sufficient strength and proper design for approval." The Aircraft Products B type is for planes under 2,600 lb., the J type for craft weighing less than 3,200 lb., and the S type for planes weighing up to 4,500 lb. The company is nearing completion of a ski for tri-engine craft.

PERSONNEL

BRIG. GEN. WILLIAM E. GILLMORE, assistant to the chief of the Air Corps, will retire June 30, after completing more than 30 yr. of service. Prior to his appointment as assistant to the chief, he was chief of the materiel division of the Air Corps at Wright Field.

G. S. IRELAND, founder of the company, has rejoined Ireland Aircraft. Inc., as executive vice-president in charge of sales. He has resigned his position as vice-president of Curtiss-Wright Flying Service, and will immediately undertake the establishment of a sales organization for distribution of Ireland flying boats and amphibions.

G. S. Ireland

EARL OVINGTON was inaugurated president of the Early Birds at a recent banquet at Alexandria Hotel, Los Angeles, Calif.

C. Q. CALDWELL, formerly with Universal Air Lines, has been appointed manager of the American Eagle Aircraft Corp., factory branch at Love Field, Dallas, Tex.

DAVID VISEL, vice-president and general manager of Curtiss-Wright Airports Corp., has been made general sales manager of Curtiss-Wright Flying Service, effective March 1.

RALPH J. HALL, assistant manager of Curtiss-Wright Flying Service at Denver, Colo., has been made chairman of the Colorado state committee on aeronautics.

MAJ. J. CARROLL CONE has been elected vice-president of American Eagle Aircraft Corp., Kansas City, Kan., and will supervise sales. D. H. HOLLOWELL, vice-president of American Eagle Corp, who has been in charge of sales, will devote his time to airport development activities of Porterfield Aviation Interests, Inc., of which he is also vice-president. Major Cone is also member of the board of governors of the N.A.A. and chairman of the state aircraft board of Arkansas.

Maj. J. C. Cone

EVAN E. YOUNG, recently U. S. Minister to Bolivia, has resigned to join the international relations department of Pan-American Airways. He had previously been Commissioner in the Baltic Provinces, chief of the eastern European division in the State Department at Washington, and Minister to the Dominican Republic.

G. L. HART has been made general manager, and JOSEPH STEINGER has been made sales manager of the Parts Division of the Robertson Division of Universal Aviation Corp., St. Louis.

FRED LUND, chief test pilot for Waco Aircraft Co., has resigned to accept a position with Curtiss-Wright Exhibition Co. at Miami, Fla.

CARL B. SCHORY, formerly sales manager for Hamilton Aero Manufacturing Co., has been appointed sales manager for Hamilton Standard Steel Propeller Co., Pittsburgh, Pa.

GUY B. STRATTON has been appointed chief flight instructor for Colonial Flying School at Rochester, N. Y.

O. C. CHRISTIANSON, recently assistant service manager of Pratt & Whitney Aircraft Co. at Hartford, Conn., has been made western representative for the company. He will be succeeded at Hartford by J. L. BUNCE of the service department.

BERNT BALCHEN has been selected as pilot for JOHN H. MEARS on a proposed attempt to break the record for circumnavigation of the world which is planned for next June. A Lockheed-Vega plane will be used, and stops are planned in Newfoundland, Ireland, Russia, Siberia, Japan, Alaska, and the west coast of the United States, with New York as the starting and finishing point.

Bernt Balchen

LIEUT. WILL W. WHITE, Air Corps, Dayton, Ohio, and LIEUT. CARL A. COVER, Air Corps, Honolulu, Hawaii, have resigned from the Army.

FRANK FOYE has been appointed chief ground school instructor for Titusville Airways, Inc., Titusville, Pa.

CLYDE V. ROOT has been made sales engineer in charge of railroad and industrial floodlighting for The Pyle-National Co., Chicago, Ill.

JAMES G. RAY, formerly operations manager, has been elected vice-president of Pitcairn Aircraft, Inc., Willow Grove, Pa. H. H. HAEBERLY, JR., has been made sales manager of the company.

MRS. CECIL KENYON and MISS KEET MATHEWS have joined the sales staff of Arrow Aircraft & Motors Corp. They will both have headquarters at Boston (Mass.) Municipal Airport.

DR. THEODOR KARMAN, professor of aerodynamics at the Aerodynamical Institute at the University of Aachen, Aachen, Germany, has been appointed director of the Guggenheim Lighter-than-air Institute at the Akron (Ohio) Municipal Airport. He will arrive in this country about April 1, and will make his headquarters in Pasadena, Calif.

ELMER G. GROSS, operations manager for Eastern Air Transport at Tampa, Fla., has been transferred to Miami. He is succeeded at Tampa by GEORGE R. CUSHING. J. F. BUCHANAN has been made alternate pilot on the Tampa-Jacksonville mail route.

E. A. GOFF has been appointed director of sales for Verville Aircraft Corp., Detroit, Mich.

MISS MARY E. VON MACH has been appointed demonstrator for Airplane Sales Co. of Michigan, distributors of Fleet planes in the state.

WILLIAM R. ENYART, associate editor of *Airway Age*, has been made editor of *The Aeronautical Review*.

AERONAUTICAL CALENDAR

Feb. 20-22	Second Annual Aviators Reunion Aviation Post No. 601, American Legion, Chicago, Illinois.
Feb. 22-23	Reunion of World War Pilots, auspices Aviation Post of American Legion, Chicago, Ill.
May 27-30	All-New England Air Tour, starting from Springfield Airport, Springfield, Mass.
May 30-June 1	Dedication and Air Meet, Bowles Airport, Springfield, Mass.
June 28	Annual R.A.F. Display, Hendon, Eng.

EXPOSITIONS

Feb. 15-23	International Aircraft Exposition, St. Louis, Mo.
Mar. 6-15	Second Annual Aircraft Show of Aero Club of Pittsburgh, Pa. Ray Krimm, director, William Penn Hotel.
Mar. 22-29	Second Annual Aviation Exposition, Buffalo, N. Y.
Mar. 26-Apr. 1	Cincinnati Aircraft Show, Music Hall, Cincinnati, Ohio, Headquarters, Hotel Sinton.
April 5-12	All-American Aircraft Show, Detroit.
April 18-26	Camden, N. J., Aircraft Show, Convention Hall, Camden, N. J. L. D. Odhner, executive secretary, Hotel Walt Whitman Annex.
May 3-10	New York Aircraft Salon, auspices Metropolitan New York Division, Distributor-Dealers Section, Aeronautical Chamber of Commerce, at Madison Square Garden, New York City.
July 6	International Transportation Exposition, Warsaw, Poland.

MEETINGS AND CONFERENCES

Feb. 24-25	Conference on Aviation Law, Auspices Milwaukee (Wis.) Chapter, N. A. A.
Mar. 5	New York State Airport Conference, Auspices A. C. of C., Mark Twain Hotel, Elmira, N. Y.
Mar. 17	Regional Airport Conference for New England, Providence, R. I.
Mar. 27-28	Mid-South Aeronautic Association Convention, Auspices Chamber of Commerce, Memphis, Tenn.
Apr. 8-9	Meeting of Society of Automotive Engineers, Detroit, Mich.
May 14-16	National Conference, Airport Section, Aeronautical Chamber of Commerce, Buffalo, N. Y.
July 3-5	Western States Aeronautical Conference, Medford, Ore.

BRIEFLY

The House of Representatives committee on military affairs has recommended that Capt. Edward V. Rickenbacker be given the Congressional Medal of Honor.

A total of 61 students recently started flight training at Pensacola naval air station.

Boeing Airplane Co. is building 90 single-seater P-12B Wasp-powered pursuit planes for the Army. The first model 204 six-place flying boats built in the Canadian factory at Vancouver are being tested there, while a model 100 Boeing plane is undergoing Army tests at Dayton, Ohio.

Ten planes, entered as exhibits in the Omaha (Neb.) auto-aero show held at Ak-Sar-Ben coliseum Feb. 17-22, were taxied directly from Ak-Sar-Ben field into the auditorium.

Curtiss-Wright Flying Service will begin the crop-dusting season in Florida May 1, and in the Rio Grande Valley about June 1.

Allied Aviation Equipment Corp., chartered in Nevada, has filed a certificate in the office of the New York Secretary of State changing its name to General Motive Control, Inc.

Additional employees are to be hired by Hamilton Metalplane Co., Milwaukee, Wis., with a view to increasing production, according to C. F. Barndt, general manager.

A flying police force has been recruited among local pilots at Buffalo, N. Y.

Aero Club of New England is planning to revive the sport of ballooning in that section. The club held its last balloon meet 15 yr. ago.

Members of the Wing and Prop Club, an organization of women pilots in Boston which now has a membership of 28, are planning a cross-country flight to be held this spring.

The building occupied by the officers' and men's mess at Camp Borden station of Royal Canadian Air Force was recently destroyed by fire.

Instruments from the plane in which Rear Admiral Byrd crossed the Atlantic have been found in the home of a fisherman at Ver-Sur-Mer, who said he found them on the beach at low tide.

Horace E. Dodge Boat and Plane Corp., chartered in Delaware, has filed a certificate to do business in New York, and will have offices at 511 Fifth Ave., New York City.

An airplane and $800 worth of equipment were stolen from Port Columbus Feb. 9. The plane was a three-passenger Travel Air, license No. NC-3823.

The armament hangar at Chanute Field, Rantoul, Ill., was destroyed by fire Feb. 5. No planes were in it at the time, and machine guns stored there were safely removed.

During its first year of operation, completed Feb. 6, 157 trips were made on the Miami-Cristobal route of Pan American Airways. Company planes have flown altogether over 500,000 mi. on all routes during this first year.

Three officers from the Chilean Military Aviation School will spend six months of study at the Ford factory in Detroit.

Lee Wilkinson and Dennis Wranse are reported as planning to establish a flying school in Floydada, Tex.

Ivan Toupolev and Igor Streachkin attended the St. Louis Exposition as representatives of U.S.S.R.

Scheduled flight of the dirigible Los Angeles to Havana, Cuba, was postponed because of the weather, which held the ship at Lakehurst.

Lee Schoenhair is planning to use a Lockheed Vega in a series of attempts to set world's records with loads of 500 and 1,000 kg. over 100, 200, and 1,000 km., over a course at Jacksonville, Fla.

Air Services, Inc., Austin, Tex., has contracted for 22 Barling NB-3 planes from Nicholas-Beazley Airplane Co., Inc.

Col. Lindbergh has abondoned the Lebec section of the Ridge Route Mountains, Calif., as a suitable site for glider operations, and will try other sections between Los Angeles and San Diego.

Chen Tien Chung, member of the Chinese Aviation Club of New York, is working on plans for formation of a similar organization in Boston.

Szekely Aircraft & Engine Co., Holland, Mich., has increased its capital stock from 100,000 to 200,000 shares.

Lieuts. Will W. White and Clement McMullen left Newark Airport Feb. 14 in an attempt to set a new speed record to Buenos Aires, in co-operation with Pan American Airways. They planned stops at Miami; Colon, Panama; Lima, Peru; and Santiago, Chile.

Lieut. Apollo Soucek was unanimously chosen to receive the medal for the greatest contribution to aviation by a citizen of Oklahoma during 1929, the medal being offered annually by Spartan Aircraft Co.

New Firms Announced

AIRCRAFT SALES CORP., Boston, Mass.; capital, 5,000 shares no par value stock; by Leslie M. Dickey, Edward J. Steptoe, and Dwight B. MacCormack; to manufacture and deal in aircraft.

FLORIDA AIRCRAFT CORP., Dunedin, Fla.; by B. C. Skinner, B. W. Skinner, C. W. Campbell; for the distribution of airplanes and equipment, and for the manufacture of planes in the Skinner Machinery plant.

HUBBARD AIR MOTORS, INC., Los Angeles, Calif.; capital stock, $300,000; by Joseph R. Bowen, Lloyd B. Hubbard, and C. E. Eden.

SOLAR AVIATION CORP., Mobile, Ala.; capital of $24,000; by E. E. McCarthy, E. E. Lingfelter, and L. M. Lingfelter.

TRADE TIPS

It has been reported that

Bids for erecting five radio masts at each of the government stations at Washington, D. C.; Atlanta, Ga.; Sidney, Nebr.; Cheyenne, Wyo.; Chattanooga, Tenn.; Nashville, Tenn.; Evansville, Ind.; Terre Haute, Ind.; Mound City, Kan.; Fort Madison, Iowa; Robertson, Mo.; Cincinnati, Ohio; Indianapolis, Ind; Columbus, Ohio; Oakland, Calif.; Fresno, Calif.; Saugus, Calif., will be received until 2 p.m. Feb. 27 by the Division of Supplies, Department of Commerce, Washington, D. C. Pictures and specifications for masts may be obtained upon request. Bids will be accepted for each job separately.

Dwight Randall, city clerk of Blackwell, Okla., will receive bids for construction of a $25,000 hangar at the municipal airport.

Tucson (Ariz.) City Council is receiving bids for lighting equipment for the municipal airport.

Park Board, Wichita, Kan., will advertise for bids on erection of an administration building at the municipal airport, to cost about $200,000.

National Airways System, Inc., Peoria, Ill., will spend $20,000 on improvements for the airport at Decatur, Ala.

Vance Breese, Breese Aircraft Corp., Portland, Ore., is negotiating for the sale of the design of his R-6 mail plane to a manufacturer.

Bids will soon be asked for lighting the air mail route between Washington, D. C., and Norfolk, Va.

The following are in the market for airplanes: Department of Property and Supplies, State of Pennsylvania, for a three-place open biplane; Miss Manila Davis, Boston Airport; Florida state Chamber of Commerce, for a monoplane; Tampa Junior Aero Club, for a training plane; T. G. Daniel, Sparton Distributing Co., Tampa; Vernon (Tex.) Flying School; Mid West Aviation Corp., Council Bluffs, Ia., for a cabin plane; John Weatherly, Route 1, Lake Manawa, Council Bluffs, Ia., for a biplane; Boston Flying Club; Jack L. Woolsey, Cleveland-Universal Flying School.

Representatives Named

BARLING NB-3—Montgomery School of Aeronautics, Montgomery, Ala.

RUSSELL PARACHUTE CO.—Northwest Air Service, Inc., Renton Airport, Bryn Mawr, Wash., has been appointed regional sales and service agency.

DAVIS—Walter S. Rogers, Boston, Mass., has renewed his distributorship for Maine, Massachusetts, and New Hampshire.

SIEMENS-HALSKE ENGINE—Petz Motor Co., Philadelphia, Pa.; American agents and exclusive American service station.

AIRPORTS AND AIRLINES

Watres Air Mail Bill Meeting Opposition

WASHINGTON (D. C.)—Strong opposition is developing in the House to the bill designed to extend the powers of the Postmaster General in the administration of the air mail, introduced for Mr. Brown by Representative Lawrence H. Watres of the Committee on Post Offices and Post Roads. Members of the House, among whom were air mail enthusiasts, have expressed the belief that the powers designated to the Postmaster General in the bill are too sweeping, and might lend themselves to future abuses unless securely safeguarded.

Objection has centered particularly upon three provisions of the bill: the fixing of a rate of $1.25 per mile without any specification of the poundage to be covered by this rate; the inclusion of mail other than air mail; and the clause providing for the payment for foreign or domestic mail carried into Canada or Mexico from the appropriation for the domestic air mail service. The provision for routing the mail over passenger lines is regarded by many as an indirect subsidy, and in opposition to past governmental policy regarding the air mail. There is also the possibility of political influence being exerted by many airlines to secure contracts, whether or not they deserved such help.

Glover Lands Measure

Assistant Postmaster General W. Irving Glover has characterized the measure as "The most constructive piece of submitted legislation ever presented to Congress for the aid of all classes of commercial aviation—air mail, passenger carriers and manufacturers." In further conversation with AVIATION's correspondent Mr. Glover stated that if air mail is the only phase of aviation to which a sub-vention is given, commercial aviation in this country will fail. "The saving effected by the reduced rates to be paid air mail operators under the new legislation," Mr. Glover continued "with a slightly increased appropriation will give a backing to passenger operators now in dire straits. Through the agencies of the Department of Commerce, the Department of Agriculture (Weather Bureau), and the Post Office Department the government is pledging itself to give every aid to find out definitely if the American people will fly. Without governmental backing commercial aviation cannot succeed as yet."

Representative Kelly of Pennsylvania, author of much of the previous air mail legislation, introduced a bill Feb. 5 authorizing the Postmaster General to extend and consolidate routes. The measure introduced by Mr. Watres for the Postmaster General probably will receive priority consideration. Should it be accepted by the committee Mr. Kelly will withdraw his bill. In discussing the situation in commercial aviation Mr. Kelly said he would favor the adoption of a direct subsidy of a substantial amount, if proposed on the floor of the House.

A hearing on the Watres bill was scheduled before the whole House Committee on Post Offices and Post Roads for Feb. 19. Proponents of the bill believed as we go to press that among the 22 members of the Committee there were enough administration supporters to get the bill reported favorably out to the House. Considerable opposition is expected on the floor, however.

A poundage limitation for rate payment probably will have to be written into the bill. This was omitted through the fear that if a rate of $1.25 was specified for a 2,000-lb. space, Congress would take it to imply that the rate for 1,000 lb. should be half the $1.25, and for 500 lb. one quarter of the original rate, and so on until the rate of payment for the smaller units was less than the cost of operation.

T.A.T.-Maddux Adds Section

NEW YORK (N. Y.)—Beginning Monday, Feb. 17, T.A.T.-Maddux is operating a double section on its eastern division with stops at St. Louis, Kansas City and Wichita. This has been inaugurated to care for intermediate business which had threatened to interfere with the through service.

Hold N. Y. Airport Conference March 5

ELMIRA (N. Y.)—A New York State Airport Conference will be held at the Mark Twain Hotel here March 5, under the auspices of the Aeronautical Chamber of Commerce. Maj. G. A. Vaughn is general chairman, and Sherman P. Voorhees is chairman of the committee on arrangements. The conference will begin at 9:30 a.m. A luncheon and dinner will be part of the program. Speakers and their subjects are as follows:

E. P. Warner, editor of AVIATION: Sources of Airport Revenue.
Anson Bigelow, of Bigelow & Black: Selection and Construction of Airports.
Maj. Reed M. Chambers, U. S. Aviation Underwriters Corp.: Aviation Insurance.
A. J. LaBaie, Airway Division: Airport Lighting.
Maj. George A. Vaughn, president of Eastern Aeronautical Corp.: Operation of Flying Schools on Airports.
State Senator J. G. Webb, chairman of New York State Aviation Commission: New York State's Plan of Aviation Development.
George M. Lord, assistant general passenger agent of Western Air Express: The Development of Commercial Airlines.

Port and Airline Rulings Proposed

WASHINGTON (D. C.)—As the result of conferences with leaders of the aeronautical industry, the Aeronautics Branch is planning to tighten up the regulations under the Air Commerce Act. For the first time, control will be extended over local airports. One of the new rules that will be suggested, it is learned, is one that will require all planes coming under the scope of the Air Commerce Act to use only airports with at least a rating of B-3-B. In this manner the Aeronautics Branch will secure indirect but none the less effective control over airports that aspire to prominence.

In justification of the extension of federal authority over local airports, it is pointed out that it would be useless to set up high standards of maintenance and for the operation of interstate aircraft as long as fields are used that make landings hazardous. The amendments under consideration contemplate also the issuance of a certificate of authority to operate. This certificate would be given to all interstate air carriers who comply with the present requirements and who meet certain additional qualifications.

These additional regulations would require the provision of proper ground equipment which includes maintenance facilities, adequate personnel, repair equipment, and radio and other communication facilities. Just how many other additional regulations will be imposed is uncertain. The Branch is known to be definitely opposed to any move that would restrict operation of the airlines. Some of the leaders of the industry, however, have voiced the sentiment that operation by responsible and capable organizations over routes in highly competitive territory will be held back until there is such regulation. In this connection, Representative Parker of New York, Chairman of the House Interstate Commerce Committee, pointed out recently that the industry has not yet reached the stage when complete regulation is necessary.

Nyrba Opens Route to Chile

NEW YORK (N. Y.)—First air mail over New York, Rio & Buenos Aires Line was scheduled to leave Sanitago, Chile, Feb. 18, Buenos Aires, Feb. 19, and Rio de Janeiro, Feb. 20. It should arrive at Miami, Fla., on Feb. 25, taking seven days from Argentina, six days from Brazil. Present plans call for weekly service over this route. The first air mail will leave Miami March 5, and will be flown south on the same schedule.

AIRPORT CONSTRUCTION PROJECTS

West

TUCSON, ARIZ., is to spend immediately, $13,000 of a $25,000 airport bond issue voted recently. Bids for $8,000 lighting equipment at Davis-Monthan Airport were called Feb. 17. The city council has ordered detailed plans for a $5,000 depot and administration building. The remaining $12,000 of the bond issue will be spent to improve the landing field. Partial oiling of runways is contemplated. Government funds to erect two radio towers near the field is in hands of the district Army quartermaster in Nogales and the erection of these towers will start within a short time, it is reported. Radio weather reports are now received at the city field every 2 hr.

Boeing Air Transport has appropriated funds for the completion of new passenger terminal facilities at seven stations on the Chicago-San Francisco Line, in anticipation of expanded passenger service this summer.

South

The $75,000 hangar and administration building for Curtiss-Wright Flying Service, Inc., was dedicated on Feb. 9 at the Miami (Fla.) Municipal Airport. The building, measuring 120 ft. square, was built by Sandquist & Snow. It includes passenger accommodations, restaurant, waiting rooms, library, shops, hangar, flying and ground school classrooms, offices and an observation balcony facing the field. The landscaping contract has been let to Exotic Gardens.

Plans for the new Shreveport (La.) Municipal Airport include an administration building, complete lighting system, about 75,000 sq.ft. of concrete in aprons and walks, two hangars, including a machine shop. The entire project will cost about $300,000, for which a bond issue recently was authorized. The land cost $152,000. Work will be done by the Airports Engineering and Construction Corporation, a unit of Southern Air Transport.

The fourth hangar being constructed at Brownsville (Tex.) Airport is rapidly nearing completion, while the third hangar is practically finished and in use. These two new hangars, in addition to two large ones already in use, will provide ample space for planes passing through this port.

A steel hangar and a three story steel and concrete terminal have been completed recently at the new Chattanooga (Tenn.) municipal airport, known as Lovell Field. The field itself is expected to be ready for flying activities before long.

Texarkana, Tex., is preparing to build a hangar and administration building and install lighting, at a cost of $75,000.

A 15,000,000 cp. beacon has been installed atop the administration building at Menefee Airport for Gulf Coast Airways. Plans include lighting installation.

A $15,000 hangar and lighting system are to be built at Natchitoches, La.

An 80-acre tract of land has been secured for a municipal airport 2 mi. from Troy, Ala. Two runways will be erected in near future.

Work will start soon on a new hangar at Denton (Tex.) Municipal Airport.

Central

Erection of the station which is to house the Omaha (Neb.) radio range beacon has been started, on a hill a few hundred yards north of the Fort Crook Airport. The apparatus is not expected to arrive before March 1, however, and installment will require approximately two weeks.

Deed to the second airport in Council Bluffs, Ia., was turned over to the city officials Jan. 31. The city council on Jan. 27 authorized the signing of the $40,000 airport certificates and the acceptance of the deed to the 200 acres. An additional $40,000 will soon be available for equiping the new field. The certificates bear 5 per cent interest and will fall due at the rate of $1,500 a year for the first 10 yr. and $2,500 a year for the last 10 yr. A 1 mill levy over a period of years for the acquisition and development of the municipal airport was authorized at a special election held Aug. 26, 1929. The levy is expected to make available about $80,000.

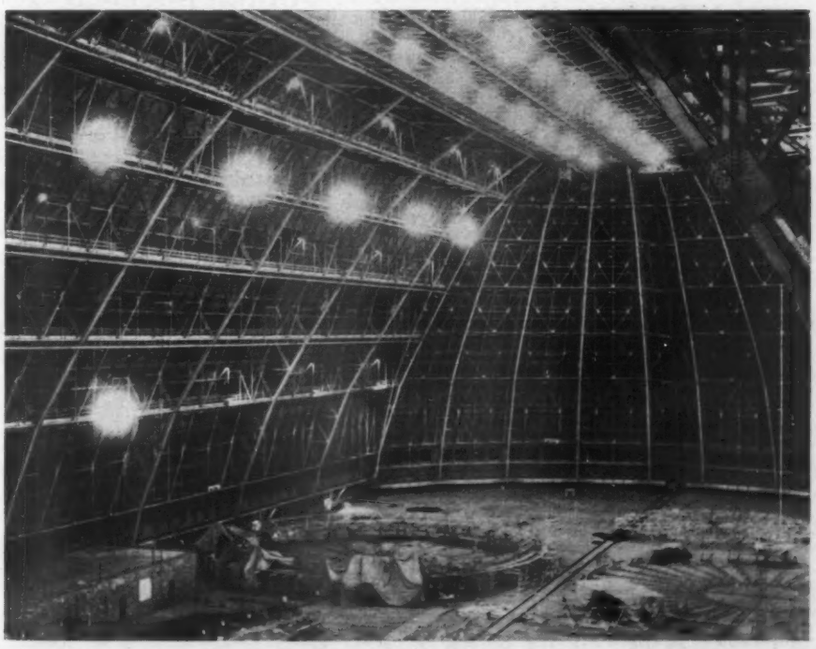
Aurora, Neb., has taken a lease on 55 acres of ground and its development for an airport will start immediately. A power line will be run to the site, and the work of installing lights and other equipment will start in the spring or early summer.

Aero Branch Makes Comments on Ratings

WASHINGTON (D. C.)—The extension of an A-1-A rating to the Pontiac, Mich., Airport is likely to be the first rating for two or three weeks yet, according to officials of the Aeronautics Branch. Many airports have made application for ratings but have not complied with all of the preliminary regulations. Field men of the Airport Section are making an intensive effort to bring matters to a conclusion at some of the airports.

In order that the greatest benefit in the rating work may be extended to the aviation industry, Branch officials are endeavoring to convince local airports that it is desirable to obtain ratings as soon as possible on the field proper and to let ratings of hangars and equipment go until a later date. This will make it possible for those who fly the air lines to obtain immediate benefit from a series of comparative ratings. Despite the seeming advisability of obtaining a rating as soon as possible on the field, many airports are waiting until they can obtain the highest rating offered on the field and the entire equipment.

Interior of Goodyear-Zeppelin Airship Dock at Night



FORTY-EIGHT electric light bulbs of 1,000 watts; 44 of 500 watts; 125 of 200 watts; 50 of 150 watts, and 250 of 100 watts, are used to light the world's largest hangar. On the floor at the left is the master-ring of the first of the new Navy airships, ready to be erected into the vertical position. To the right of it is one of the intermediate rings in process of construction and back of that may be seen the master-ring bulkhead, also in process of construction.

Cleveland Port Income Approximates Expenses

CLEVELAND (OHIO)—Jumping from $9,259 in 1927 to $28,424 in 1929, the income derived from Cleveland Municipal Airport by the city almost equalled the 1929 operating expense of $28,509. Income for 1928 was $16,417. Income for the current year is expected to exceed the requested expense budget of $33,000.

Operating expense each year since the port was opened in July, 1925, follows: 1925, $2,995; 1926, $11,572; 1927, $30,482; 1928, $40,983; 1929, $28,424.

Eventually, when the number of aircraft operators leasing ground for hangars has increased and aircraft factories have located on sites reserved for them, the income may pay part or all of the estimated $117,000 yearly charge for interest and retirement on the $1,680,000 bonds voted at various times by City Council to purchase the 1,000 acres of airport land, install drainage, roads and aprons, and build a complete administration center.

Five air mail and three passenger airlines are operated into Cleveland Airport now. In addition there are four aviation schools, an aircraft engine experimental company, the unit of the Ohio National Guard, and an airplane sales and service concern. These operators have an estimated $500,000 invested in the port's twelve hangars and a like sum invested in flying and other equipment.

Landing Beam Described

WASHINGTON (D. C.)—Further details about the landing beam method of making landings in fog, now being experimented with by the Bureau of Standards at College Park, Md., have been announced. The exact nature of this beam has not been divulged [See AVIATION for Dec. 28]. It is said to be of between 60,000 and 100,000 kc. The receiving arrangement is said to be simple, using a visual indicator on the instrument board of the plane. The curve of the beam down which the plane is to be guided to the ground is shaped about as follows: at 3 mi. from the transmitter, the beam is 2,000 ft. above the ground; at 2 mi. it is 500 ft. above; at 1 mi. it is 240 ft. above; at ½ mi. it is 85 ft. above; at 1,000 ft. it is 15 ft. above; at 750 ft. it is 10 ft. above and at 500 ft. it is 5 ft. above. The plane then is in a position to land.

G. E. to Make Donaldson Lights

SCHENECTADY (N. Y.)—General Electric Co. will hereafter manufacture all the special equipment sold by Airport Lighting, Inc., which holds the patents for the Donaldson Automatic Night Landing System. By the terms of a reciprocal agreement, Airport Lighting, Inc., becomes a national dealer for all General Electric equipment applicable to the wiring and illumination of airports. Similarly, General Electric Co. will catalog and actively promote sales.

Open Atlantic-Birmingham Line

ATLANTA (GA.)—Service over Davis Airlines between this city and Birmingham, Ala., was inaugurated Feb. 13. James M. Jones, president of the city commissioners of Birmingham, and I. N. Ragsdale, Mayor of Atlanta, together with a number of prominent business men, exchanged visits as guests of the new line.

Hanson Announces Fog-Landing Device

CHICAGO (ILL.)—Perfection of a new device for directing planes in landing at a fog-bound field was announced recently by Earl C. Hanson, well-known radio engineer of this city. Mr. Hanson is largely responsible for the development of the cable-piloting method which has been experimental with New York and other large harbors as a means of guiding surface vessels safely into port when thick weather is encountered. The new safety contrivance for aircraft is an adaptation of the earlier invention.

The device consists of two single-turn loops extending out from the airport boundary a distance of almost 4,000 ft. The coils are approximately 200 ft. apart at the field ends but diverge so that there is 1,500 ft. between them at the outer ends. Each coil is impressed with a 1,000 cycle audio-frequency impulse generated at a ground station. "Choppers" are employed to open and close the circuit in each loop, so that one coil sends out a series of dashes and the other dots. A pilot flying a middle course between the two coils hears an unbroken sound in his headqphones.

At right angles to the inner ends of the coils is a six-turn loop, which measures 600 ft. in length and 200 ft. in width. This is known as the "gun coil." The sound in the headphones materially increases when a plane is over this loop, and the pilot knows that he is in a position to "shoot" the field. To indicate the altitude of the plane over the gun coil, Mr. Hanson has devised an inductive altimeter, which of course gives the height above the ground and not above sea level. The altimeter is said to be accurate to one-quarter of an inch.

Two types of equipment have been evolved for receiving the audio-frequency signals. One is for planes not equipped with radio sets, while the other is for radio equipped transports.

Experiments with Mr. Hanson's invention have been conducted at the Ford Airport, Lansing, Ill., for more than a year. Following the public announcement of the perfection of the safety device, Mr. Hanson received telegrams of congratulations from such men as Dr. Lee De Forest; W. S. Terrell, chief of the radio division, Department of Commerce; and Capt. S. C. Hooper, in charge of the radio development of the United States Navy Department.

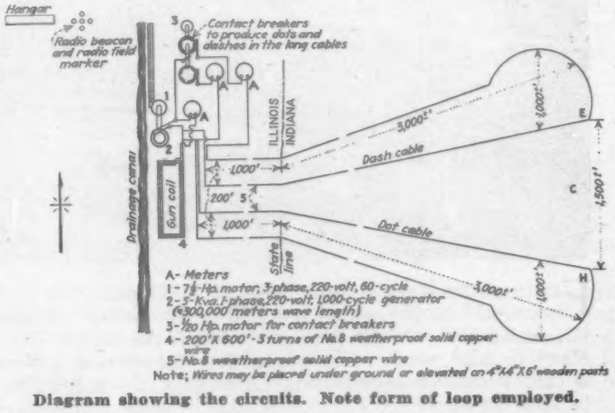

Hangar
Radio beacon and radio field marker
Contact breakers to produce dots and dashes in the long cables
ILLINOIS
INDIANA
Drainage canal
Gun coil
Dash cable
Dot cable
State line
3,000'
1000'
4,500'
A- Meters
1- 7½-Hp. motor, 3-phase, 220-volt, 60-cycle
2- 5-Kva. 1-phase, 220-volt, 1,000-cycle generator (300,000 meters wave length)
3- ½0 Hp. motor for contact breakers
4- 200' X 600' - 3 turns of No.8 weatherproof solid copper wire
5- No.8 weatherproof solid copper wire
Note; Wires may be placed under ground or elevated on 4"X4"X6' wooden posts

Diagram showing the circuits. Note form of loop employed.

Air Mail Traffic Drops Again in Jan.

WASHINGTON (D. C.)—With flying conditions continuing unfavorable from December into January, the total of air mail carried during the latter month dropped to 505,933 lb. The amount in December, which included the Christmas holidays, was 618,809 lb., the difference being 112,876 lb. The daily average for January was 16,320 lb. and for December 24, 752 lb. A total of 488,709 lb. was carried in January a year ago. These figures are for the domestic services only. The preliminary figures for January by routes are:

	Mi.	1929 Nov.	1929 Dec.	1930 Jan.
Boston-New York...	192	10,160	9,280	7,391
Chicago-St. Louis..	278	5,104	3,455	3,618
Chicago-Dallas.....	1059	36,286	27,438	24,914
Salt Lake-Los Ang.	600	65,821	84,442	61,268
Salt Lake-Pasco....	530	23,571	25,445	18,117
Seattle-Los Ang....	1141	20,936	23,526	18,484
Chicago-Minn.....	503	16,467	15,042	14,199
Cleveland-Pitts....	123	10,155	9,074	3,333
Cheyenne-Pueblo...	199	7,166	8,455	5,512
Cleveland-Louis'le..	345	5,936	4,048	4,286
New York-Chicago.	718	142,359	113,858	109,311
Chicago-San Fran..	1932	150,550	173,945	127,074
New York-Atlanta..	763	30,264	28,151	27,141
Albany-Cleveland..	416	7,458	6,628	4,971
Dallas-Galveston...	320	3,160	3,323	2,195
Dallas-Brownsville..	529	7,101	7,760	6,626
Atlanta-New Orl's..	483	7,386	6,854	6,889
Chicago-Cincinnati.	270	6,824	4,680	4,117
Atlanta-Miami.....	736	10,893	13,181	11,440
Great Falls- Salt L.	489	5,003	5,993	5,283
Chicago-Bay City..	712	14,565	6,987	10,893
St. Louis-Omaha...	403	13,042	13,338	10,549
New Orl's-Houston.	319	3,569	4,083	4,063
Chicago-Atlanta....	768	6,853	7,639	6,987
Pasco-Seattle.....	449	12,532	12,134	7,272
Total.....		623,161	618,809	505,933

Decrease—112,876 lb.
Daily Average—16,320 lb. for January.

Canada Mail Reported

OTTAWA (ONT.)—A total of 435,163 lb. of air mill was carried over the various routes operated in the Dominion in 1929. The route from Sioux Lookout and Narrow Lake in Northern Ontario and return accounted for the largest single route, a total of 83,404 lb. being flown. The Montreal-Rimouski route, operated only 7 mo., was second with 68,672 lb.

Airway Briefs

A teletype service from Omaha, Neb., to Kansas City and Chicago, has been placed in operation by the Department of Commerce. Additional teletype machines, making a total of six, have been installed at Moline (Ill.) airport.

Colorado Public Utilities Commission has authorized Pikes Peak Air Commerce, Inc., to operate a taxi service from the Pueblo Municipal Airport.

There are now 398 towns with a total of 547 airmarkers in the State of Ohio, according to a report by the bureau of aeronautics.

Boeing System and other companies in United Aircraft & Transport Corp. have taken offices on Michigan Ave. at Van Buren, Chicago.

A Stearman Special mail plane has been placed in service between New Orleans and Atlanta, Ga., by Gulf Coast Airways. Three Fokker F-14s have been added to the Western Air Express fleet.

Reresentatives of Sioux City, Ia., Sioux Falls and Watertown, S. D., and Omaha, Neb., met recently and petitioned the government to establish an air mail route between Omaha and Minneapolis, via Sioux Falls and Mankato, Minn.

About 1,500,000 gal. of gasoline and 25,000 gal. of oil were used last year by mail, express and passenger planes operating between Chicago and San Francisco, Los Angeles and Seattle.

Alaska-Washington Airways has announced an expansion program involving the expenditure of about $250,000 for planes, hangars and facilities. Service is soon to be resumed between Vancouver and Seattle, with the fare cut to one-third of the former rate.

Western Canada Airways has purchased three Boeing 40-B4 mail-passenger planes for use on the Winnipeg-Calgary air mail route, inaugurated Feb. 3.

Stout D & C lines plans to operate a regularly scheduled service on Lake Erie with two 20-passenger Dornier flying boats.

Survey of the St. Louis-New York route for lighting has been started by the Department of Commerce.

Service by S.A.F.E. between St. Louis and Sweetwater, Tex., Kansas City and Dallas, Tex., was suspended temporarily because of muddy conditions of flying fields.

An airmarker 379 ft. long, with letters 50 ft. high, was recently constructed by the local American Legion post at Pasadena, Calif.

Wiley Post recently flew 975 mi. from Portland, Ore., to Los Angeles in 5 hr., 12 min., in a Lockheed Vega carrying four passengers. Frank Anderline, West Coast Air Transport pilot, flew a three-engined Fokker from Portland to Seattle in 45 min., with six passengers.

General Tire & Rubber Co., Akron, Ohio, has refused an offer by the city of $1,000 per acre for 59.3 acres adjacent to the municipal airport.

All aircraft arriving in California from Mexico will be inspected hereafter by state officials, as part of the agricultural quarantine regulations.

Maj. William F. Centner, superintendent of Port Columbus, Ohio, airport, has asked for the establishment of a board to consider problems of increasing avenues of access to the field, construction of a grandstand, purchase of fire fighting apparatus, and erection of lights on the drive from Poth Road to the administration building.

Plans for two new giant steamships to be used by U. S. Lines in North Atlantic passenger service provide for equipment to handle ship-to-shore air mail service.

Standard Airlines, Inc., planes were flown over 500,000 mi. between Los Angeles and El Paso, Tex., during the first year of operation.

Three proposals for adding to the size of Boston Airport are now before the Massachusetts legislature. The State owns land adjacent to the field.

Neon beacon and boundary lights are being installed experimentally at Kansas City (Mo.) Municipal Airport.

Houston (Tex.) Main Street Airport will be reopened about March 15 after being closed for six months.

Nine planes were destroyed when the Woverine Flying Service hangar at Capital City Airport, Lansing, Mich., burned Feb. 15, with damage estimated at $125,000.

Latest report lists 89 airports in the State of New York, as compared with 39 last year.

Night passenger service between Los Angeles and San Francisco will soon be inaugurated by Boeing System.

A Board of Airport Commissioners, with six members, to have full jurisdiction over the new municipal department of airports, has been appointed by the Mayor of New Haven, Conn.

Eastern divisional headquarters of Varney Air Lines will be established at Boise, Idaho, March 1, with Vice-President Leon D. Cuddeback in charge.

Boeing System has installed a 500,000,000 cp. beacon on its hangar at Cheyenne, Wyo.

The accountying system of Universal Aviation Corp. is being centralized, and accordingly accountants at various divisional headquarters have been transferred to St. Louis.

New York offices of T.A.T.-Maddux Lines have been transferred from 27 W. 57th St. to Pennsylvania Station.

Stearman planes with Wright J-5 engines, equipped with radio, are now in use on Continental Air Lines, division of Universal Air Lines, between Cleveland and St. Louis.

Commercial air service has been resumed in Alaska. Commercial planes have been used in the hunt for Carl Ben Eielson.

Detroit Municipal Port Progress Stated

DETROIT (MICH.)—Despite unusually severe winter conditions passenger carrying activities at Detroit's new city airport during January increased considerably over the December total, according to figures just released. January saw 173 arrivals and 181 departures, against 137 arrivals and 133 departures during December. Two hundred and ninety-three persons made sightseeing flights as against 189 in December.

Thus far the airport has but three permanent buildings in addition to the $1,000,000 hangar and terminal building rapidly nearing completion by the Department of Public Works, those being the smaller city hangar now occupied by the Michigan National Guard air unit, the Schlee-Brock hangar and field administration office, and the newly completed Lawrence P. Fisher hangar. The huge $1,000,000 structure will be used to house the third annual All-American Aircraft Show in April.

Starts Line to Winnipeg

MINNEAPOLIS (MINN.)—Passenger service between Minneapolis and Winnipeg was established Feb. 15 by Northwest Airways, Inc., application being filed simultaneously with the United States Post Office Department for establishment of air mail service from Minneapolis to the Canadian border. The line is an extension of the company's air mail, passenger and express service, now in operation between the Twin Cities and Chicago. Planes for the present will operate on a weekly basis, but will be put on a daily basis within 30 to 60 days. Planes make the northbound trip on Saturday, returning Sunday. A Hamilton cabin monoplane is used with Chadwick Smith as pilot.

Increase N. Y.-Boston Service

NEW YORK (N. Y.) — Colonial Airways System has rearranged its New York-Boston schedule, adding a morning trip from this city, so that business men may make the journey, spend five hours transacting business, and return the same day. Planes now leave Newark Airport at 9 a.m., 12 m. and 5 p.m. daily. They leave Boston Airport at 8 a.m., 12 m., and 4:30 p.m. daily. The trip to Boston takes 1 hr. 45 min., and the return journey requires 2 hr.

S.A.F.E. Reduces Rates

TULSA (OKLA.) — A new low rate between Tulsa and Dallas has been placed in effect by the Southwest Air Fast Express lines with a reduction from $18.50 to $12.75. The Kansas City-Dallas fare has been reduced from $30 to $24.25 and the St. Louis-Dallas rate from $36.50 to $30.75. Double-daily service between Tulsa and Dallas by way of Oklahoma City is now being offered. This was to be increased to triple-daily service beginning Feb. 15.

FOREIGN ACTIVITIES

China Airways Has Troublesome Career

SHANGHAI (CHINA)—The Curtiss-Wright subsidiary, China Airways, suspended operations for one day only on December 16 under unexplained circumstances. The president of the corporation, Mr. Ernest B. Price, issued a statement that suspension was not due to financial reasons. The public, therefore, has been left to speculate upon the various motives behind this event. Since then the fate of the American contract has been in doubt. Recent reports it has been cancelled have not been confirmed.

Political intrigue is suspected in view of the recent change in Chinese government personnel. A few days prior to the suspension, Mr. Sun-fo, Minister of Railways, who organized the project and was president of the Chinese holding company, resigned. In his place Mr. Wang-peh-chun, Minister of Communications was appointed.

Postal Unit Important

Mr. Wang had previously started an independent air mail line between Shanghai and Nanking under the auspices of the Ministry of Communications. Recent statements in the press indicated his dissatisfaction with the agreement entered into between the American company and the China National Aviation Co., of which he had just become the head. Mr. Wang, in referring to this contract, stated, "The air mail contract entered into by the National Aviation Co. and the American company is too unreasonable to exist. For instance, ten grams is used under the agreement as a unit for the calculation in mails. However, our postal unit, which is also an international unit on postage, is twenty grams. If we act on the agreement entered into, China has to withdraw from the International Postal Association of which she is a member. Air mail is an international undertaking, and therefore, it is not wise to act upon the agreement in opposition to the international postal rules. The National Aviation corporation has been operating for the last three months. The receipt of the November air mail totals $30,000. But under the agreement, the Government has to pay $100,000 monthly."

At the time of the suspension of service the Shanghai Postal Workers' Union voiced opposition to the air mail agreement. The other side of the picture is painted in an article in the Dec. 21 issue of the China Weekly Review, which says in part:

"The statement of Mr. Price, the representative of the American aviation interests, makes clear the fact that China is paying considerably less for the transport of mail than are other countries, the figures showing that while China is paying $2.40 a pound for mail transportation, the United States is paying a minimum of $3 a pound for much shorter distances. Owing to the newness of aviation in China it is inevitable that the new air mail service in China should be costly at the beginning but, as Mr. Price explained in his statement, there are excellent prospects that the service will not only be placed on a paying basis but that it shortly should be able to pay a profit. The amount of mail carried has jumped from 11 lb. in the first week, Oct. 21-26 to 1,060 lb. for the week of Nov. 25-30. Surely sufficient has been accomplished to prove the possibility of air mail and air transport in China from the standpoint of ordinary business and even of more importance from the standpoint of government business. This indicates without much possibility of dispute that the far-sighted Chinese officials who invited the American Curtiss-Wright-Robertson interests to come to China were on the right track."

New Bleriot Transports Tested

PARIS (FRANCE)—Bleriot Aeronautique is completing tests with its Bl.111 low-wing single-engined light transport monoplane, fitted with 280 hp. Hispano-Suiza geared engine. The machine is of wood construction, with wing rigidly braced to the landing gear. A comfortable cabin is fitted for four passengers with lavatory and separate luggage compartment. Electric installation is provided for night flying. Large fuel tanks give a specially long range. General characteristics are: span 52.4 ft.; length 35.7 ft.; height 10.3 ft.; area 366 sq.ft. Weight empty 2,650 lb.; useful load 2,210 lb. (made up as follows: crew and instruments, 210 lb.; four passengers and luggage, 884 lb.; 170 gal. gasoline 1,016 lb.; 13 gal. oil, 99 lb.). Gross weight, 4,860 lb. Max. speed, 121 m.p.h.; cruising speed, 106 m.p.h.; endurance at cruising speed, 9 hr. 15 min.; range 965 mi.

Bleriot Trophy for 622 m.p.h.

PARIS (FRANCE) — Rules governing award of the Bleriot Trophy are still under consideration by the racing committee of the Aero Club of France, but it is practically certain that the essential requirement for winning it will be a speed of 1,000 km. per hr. (622 m.p.h.). According to reports, no type of plane will be barred, and no limitations will be set. Several French designers have expressed the opinion that a plane could be built to fly that speed if a parachute device can be developed to land it.

Caproni Builds New Transport

TALIEDO (ITALY) — Latest development of the Caproni factory is a ten-passenger semi-cantilever monoplane, designed for transport service. It is powered with three Lynx engines, giving it a top speed of about 130 m.p.h. The structure is largely of steel, though some wood is used in the wings. The span is 63.3 ft., length 44 ft., height 12 ft., useful load 3,300 lb., gross weight loaded 8,800 lb.

Spain Makes 10-yr. Subsidy Agreement

MADRID (SPAIN) — Minimum subsidy of $187,500 will be granted annually for 10 yr. to Compania de Lineas Aereas Subvencionadas by the terms of a contract recently entered into by the Spanish government. In return, the company undertakes to operate the following lines: Madrid - Barcelona; Madrid - Porrino; Madrid - Burgos; Madrid-Seville-Cadiz; Seville-Larache; Barcelona - Valencia - Alicate - Seville; Barcelona-Palma de Mallorca; Vigo-Coruna - Gijou - Santander - Bilboa-San Sebastian; Melilla-Malaga-Cauta-Cadiz; Cadiz-Canary Islands; Seville-Portugal; Burgos-France; Madrid-Portugal; Barcelona-Italy; Barcelona-France; Galicia-Portugal.

The government further agrees not to grant any subsidy, premium, or mail contract to any competing company, though it may grant permission to operate to other lines. The company agrees to maintain a paid-up capital at least three times as large as the subsidy, and must have its rates approved annually by the government. The company will pay a maximum of 5 per cent interest to shareholders, and if there is greater net profit the government will receive up to 2½ per cent of the capital, and the next 2½ per cent will be distributed to company personnel.

Special rules are laid down for amortization: 10 per cent annually for buildings, 20 per cent for radio stations, 15 per cent for other material. Engines will be amortized after 500 hr., metallic airplane cellules for seaplanes after 1,000 hr., and mixed construction cellules after 600 hr. These periods of amortization may be revised every four years.

Upon termination of the contract, all the company's property will be turned over to the government, in return for a sum equal to the difference between the sums invested and the amortization accomplished. The government may terminate the contract upon these conditions at any time, with the payment of an indemnity; and if the company terminates the contract prematurely, it must pay the difference between its debts and assets, in addition to turning its property over to the government. [Information furnished by Department of Commerce representative—Ed.]

Italy Forms Salvage Service

ROME (ITALY)—Ten bases have been created by the ministries of marine, aviation, and colonies in connection with a salvage service for aircraft making forced landings, or being disabled on land or sea in or near Italy.

Foreign Briefs

A supplementary credit of about $5,440,000 for 1929 was given to the French Air Minister by the law of Dec. 12. Of this amount, $360,000 was for civil aviation, $1,500,000 for military, $3,300,000 for naval, and $250,000 for colonial aviation.

Sir Charles Wakefield has contributed $4,860 to a fund for the promotion of gliding in England.

Complete lighting equipment, steel hangar, underground gasoline tanks, oiled runways, 3,500 ft. and 6,000 ft. long, and other equipment have been installed at Los Mochis Airport in the state of Sinaloa, Mexico. An air meet is to be held there some time in March.

A Ministry of Aviation, to take over all services handled before by the Ministries of War, Marine, and Communications, was established in Greece by law of Dec. 23, 1929.

Squadron-Leader Bert Hinkler, Australian pilot, is constructing an experimental amphibion monoplane, to be powered with two 40 hp. Salmson engines, at Southampton, England. The engines are to be mounted in tandem, and the plane is designed to carry four passengers.

The Brazilian government has agreed to loan $11,000 to the Rio Grande do Norte air school. The Sao Paulo government has given a similar sum for the improvement of the civil aero society school in that city, and will give a bonus of $110 for every pilot graduating from it, up to 25 annually.

Dr. Jongbloed, medical officer in the Dutch Army, has concluded as a result of tests on K.L.M. pilots that regular flying in the tropics, even when it involves frequent changes from one climate to another, has no particularly deleterious physical effect.

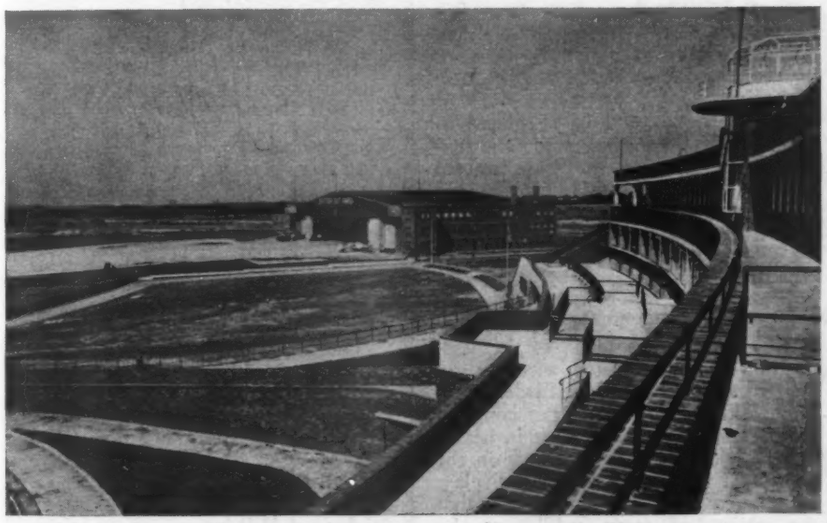
An agreement for handling Italian air mail on the French Marseilles-Bagdad line has been signed by the French and Italian governments.

Sir Charles Dennistoun Burney has proposed that $50,000,000 be taken from the annual budget of England's fighting services to be used for development of air communication throughout the empire.

There are 266 licensed private pilots and 156 licensed commercial pilots in Australia, according to a recent report. There are 212 aircraft registration certificates, 25 airport licenses in force, and 213 licensed mechanics.

According to present plans, the British dirigible R-100 will be flown to Montreal late in April. A mooring mast and hydrogen generating plant will be available at St. Hubert Airport.

Hamburg, Germany, Adds New Buildings



THIS IS A VIEW of the Luft Hansa hangar at the Hamburg (Germany) Airport, taken from one of the terraces on the front of the huge administration building. This structure is flanked on the other end by a hangar similar to that shown in the photograph. Both hangars are of modern iron construction with brick sides, and have an unsupported span of about 200 ft. The two hangars are connected by a wide concrete apron in front of the administration building, in the shape of a large crescent. This apron is more than 150 ft. wide. Concrete walks are placed between all the buildings and the apron. The new buildings are concentrated in one corner of the airport, and along one side are the old structures and the radio towers.

Observation terraces have been built on the three floors of the administration building, so that as many as 20,000 spectators may be accommodated. The building itself houses the post office, customs, police, meteorology, radio and general airport administration offices, as well as the quarters of the various traffic transportation companies. Running through the building is a hallway flanked on either side by the offices just described, which have large windows.

Principal Military Aircraft Estimated

LONDON (ENGLAND) — The Air League of the British Empire recently issued the following figures representing the strength of various nations in military aircraft:

France, first line, 1,730; reserve, 3,000; total, 4,730.
United States, first line, 1,463; reserve, 350; total, 1,813.
Italy, first line, 840; reserve, 800; total, 1,640.
Great Britain, 772; reserve, 520; total, 1,292.
Japan, 572; no reserve; total, 572.

The English aeronautical weekly *Flight* gives the following figures:

France: total 1,350.
United States: first line training and reserve, 1,110. Navy, first line training and reserve, 1,030; total of 2,140, of which only about 900 are first line machines.
Italy: first line, ready for war, 1,000; reserves, about 800; total, about 1,800.

Announce New Cabin Moth

STAG LANE (ENGLAND)—De Havilland Aircraft Co. will place an entirely new model Moth plane in production this year, to supplement the present line. The new model is to be known as the Moth Three, and it will be a three-passenger cabin monoplane of semi-cantilever structure. It will be powered with a new 120-hp. inverted Gipsy III engine. Advance performance figures are given as follows: high speed, over 120 m.p.h.; cruising speed, 100 m.p.h.; landing speed, 42 m.p.h.; range, 500 mi.; climb, 650 ft. per min.; ceiling, 17,000 ft. The company is also developing the six-passenger Hawk Moth for regular production.

De Havilland Makes 1929 Report

LONDON (ENGLAND)—Dividends at the regular rate of ten per cent were paid for 1929 by De Havilland Aircraft Co, Ltd, out of net profit of $237,020. This represents an increase of 147 per cent over the net income for 1928, which was $95,868. In addition, a mortgage debt of $114,838 and bank loans of $44,087 were retired. New stock was issued, and current assets Sept. 30, 1929, were $1,529,303, with liabilities of $319,866. Of the assets, $357,083 were in government bonds or cash. The company also increased its investment in De Havilland Aircraft of Canada, Ltd.

Italian Sets Light Plane Record

ROME (ITALY)—Subject to homologation by the F.A.I., two light plane records were recently established by Renato Donati in a Fiat A. S. 1 plane, powered with Fiat A.50 90 hp. engine. He covered about 1,875 mi. over a closed circuit, and remained in the air nearly 30 hr., thus exceeding the previous marks both for distance and duration. He carried a passenger during the flight. The total loaded weight of the plane at the take-off was 2,310 lb., of which about 1,100 lb. were fuel and oil.

WHAT OUR *Readers Say*

A Bad Stunt and a Good One

TO THE EDITOR:

I attended the Air Races at Miami and was particularly impressed with two events. One was the stunting of a Ford Tri-motor, the other an impromptu cut-switch dead stick landing directly in front of the stands. The reaction of the spectators was so different in each case that it might be of interest to note that here, and to analyze the reasons for each.

First let it be remembered that that enormous gathering was composed almost entirely of non-flyers, the man-in-the-street type; ignorant for the most part of the technicalities of flying, but tremendously interested, anxious to learn, and willing to be convinced. It is to him that the industry must look if it is to succeed, and the impressions he gains from attendance at such meets will have a great part to play in advancing or retarding its growth.

The Tri-motor lumbers out upon the field and warms its motors. It is announced that the air liners of today are similar to this ship, and that ships of this type will make flying safe and popular. The onlooker receives an impression not unlike that which he would form from looking at a rugged steel pullman car. He visions a ride of steady solid comfort for himself and his family. He is favorably impressed. It is then announced that this plane will attempt to loop-the-loop, and fly on its back. The danger of the feat is stressed. Mr. man-in-the-street begins to have misgivings. Perhaps he has never flown. Are the vagaries of pilots such that they will even try to stunt these solid-looking passenger ships? Certainly then, he will be very careful not to try an air voyage yet awhile. He is not interested in the ships ability to stand strain. He believes it can stand all normal strain or else the government would not have granted it a license. He did not ask the railroad company to derail a safety steel car at high speed in front of him just to prove it would not hurt the car. However, he watches the ship mount into the air, and with the grace of a young elephant begin to disport itself. With great danger to the pilot and even to himself, Mr. Spectator watches this flying apartment house go through a few badly executed loops, and then fly on its back losing altitude at an alarmingly rapid rate. It lands. There is not a cheer, not a ripple of applause. A lively sense of the insecurity of transport aviation is the impression which will linger long after the details of that exhibit have passed.

But another event is ready. Scarcely 500 feet above the stands a small biplane is sighted. The engine is dead and the propeller can plainly be seen stock still. Fingers point, excited voices cry out to look. And why not? Is not a miracle happening before their very eyes? Remember they represent the man-in-the-street, and he believes, 95 per cent of him, that when an airplane motor quits, the plane and its passengers will plunge straight to earth and crash to a terrible death. Yet here is just such a plane, which instead of nose diving to earth, spirals gracefully and lightly to a beautiful three pointer right in front of the grand stand. Cheer after cheer greets the finish of this demonstration. Hats wave and hands clap. Safe flying has been put over. The impossible has been accomplished and many a man, and woman too, is ready for the first flight.

If air meets could be regulated to include more of the safe and sane features, and less of the hare-brained variety, the public would be convinced of the safety of aviation, rather than frightened by its sensantionalism.

WOODIE KANE,
F.A.I. Pilot.

[Although we hope that such ignorance of flying as leads to the supposition that a machine with a dead engine is going to fall vertically to an immediate crash is no longer common among the lay public, we are in hearty accord with Mr. Kane's views on the right and the wrong kind of display. Emphatically we do not believe that the giving of stunt exhibitions by commercial planes will contribute to genuine popularity for aviation.—ED.]

Performance Tests

TO THE EDITOR:

I agree with Mr. Wead's comments in his article of December 7 that real performance testing in the United States hardly exists outside the Army, the Navy, and the N.A.C.A.

If Mr. Wead succeeds in accomplishing his purpose, I think that his activities will be very beneficial, though it certainly is a sad commentary on the aeronautical engineering profession if we must admit that few if any of our airplane companies have engineering staffs capable of getting good results from performance tests. Personally, I think that the situation is better than that.

To my mind, what we need is not so much technical improvement as common honesty. The trouble is not so much that airplane manufacturers are unable to get reliable results. It is rather that some of them do not want them. I know I am prejudiced, but I think that what is needed most is a removal of the sales and publicity departments from the necks of the engineers.

[The writer of the foregoing letter is well known to us as a very prominent aeronautical engineer, in close contact with but not actually engaged in the airplane industry. For obvious reasons he has requested that his name be withheld from so very critical an expression, but we can certify to his standing and competence.—Ed.]

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Sunrise Airport

TO THE EDITOR:

In your recent issue of AVIATION dated January 25, you carried an article entitled "Surveying the Airport Problem in New York." This article covered the subject in great detail, but for some unknown reason it failed to even mention the most active Airport in New York City.

The Sunrise Airport is situated on the Sunrise Highway in Ozone Park, midway between the Crossbay and Rockaway Boulevards. It is only 25 minutes drive from down town Brooklyn, 30 minutes from the 59th Street bridge and 6 minutes from the Long Island Jamaica Station, in addition the Richmond Hill busses run to within 3 blocks of the Field. It is the home of the Sunrise Flying Club, the largest

Activities at Sunrise Airport at Ozone Park, Long Island, N. Y.

and most successful Flying Club in the Metropolitan District.

We cannot help but feel that we have been rendered a gross injustice by your oversight and would appreciate your rectifying it as you may see fit. Enclosed you will find some pictures taken last Sunday at our Field, which should bear out our claims.

I am a subscriber of AVIATION and all of our members look forward with interest to each issue of it. Your description of new Airplanes is especially interesting.

Wishing your Publication the continued success it merits, I remain.

BERT SHIELDS,
President,
Sunrise Flying Club of Long Island.

[As Mr. Shields infers the omission of the Sunrise Airport from our recent articles was entirely due to oversight. The operations there having been somewhat restricted in nature have not received general attention.—Ed.]

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A Welcome to St. Louis

TO THE EDITOR:

No doubt you know that St. Louis is my home town and I would like very much for the whole aircraft industry to know that there is someone in St. Louis that will be glad to welcome those that are coming to attend the aircraft exposition which will be held here the 15th to the 23rd of February.

I want to extend an invitation to the entire aeronautical world to come out to see our facory, located on the Lambert-St. Louis Flying Field, at Robertson, Missouri, and see how we manufacture the Robins. Won't you please convey this message to your readers?

WM. B. ROBERTSON,
President,
Curtiss-Robertson Airplane Mfg. Co.

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Air Investors, Inc.

TO THE EDITOR:

I wish to call your attention to certain errors in the article appearing in the January 25th issue of AVIATION, outlining various aviation groups which have been created by merger and consolidation.

While the text preceding the tabulations does not clearly indicate whether or not the subsidiaries mentioned under each major company are absorbed, controlled by stock ownership, or dominated in some other way, the inference is that the major companies are holding companies for the smaller units listed under each.

Air Investors, Incorporated is not a holding company. It confines its activities purely to the investment of its resources in those activities which it feels have reason to succeed in aviation or allied industries. It owns no stock whatsoever in three of the five companies listed under it. In one of the remaining two companies it owns approximately a 10% interest and a somewhat larger interest in the remaining one. It would have been almost as appropriate to have included in this list Bendix Aviation Corporation, Aluminum Company of America or Thompson Products, Inc., in all of which Air Investors, Incorporated has good-sized holdings.

On account of our activities and investigations of aviation and allied industries, we have been and are in an excellent position to advise those charged with the active management of the companies in which Air Investors, Incorporated has interests. On the other hand, the members of our organization have, from the first, appreciated that information concerning individual companies must be most closely guarded to properly justify the confidence placed in our organization by the managements making the information available. We are anxious to avoid creation of a false impression that Air Investors, Incorporated is a holding company or under undue influence from any of the larger groups in aviation, despite our close contacts with them. We pride ourselves on the independence of the Corporation in making, retaining or disposing of its investments as its Board of Directors or Executive Committee may see fit. The position of managing or controlling one or more companies immediately prejudices a group in the eyes of other companies in competing lines, We would then become, not an impartial investment unit obtaining information for its confidential investment use from all sources, but a management company particularly interested in the development of the operations which it supervises.

The number of shares of common stock and the number of shares of convertible stock outstanding as given in the article in Aviation are also in error. The correct amounts will be published shortly in the annual report for 1929, which is in process of preparation.

I feel sure that you will appreciate our point of view with respect to the above and will take such steps as you feel advisable to correct the impression created by the article referred to.

HARVEY L. WILLIAMS,
President, Air Investors, Inc.

[We of course regret the errors to which Mr. Williams calls our attention. Unfortunately it is very difficult, in many cases, to get accurate information on the distribution of stock. So far as the major holding companies, or so-called "Big Four," are concerned, however, we have every reason to believe that the information contained in our article of Jan. 25 was substantially accurate.—Ed.]

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Army Training for Civilians

TO THE EDITOR:

Wouldn't it be a good idea for you to editorialize a little on the army establishing training periods for non-military pilots, similar to the Citizens' Military Training Camps which are now so popular?

Instruction for a week or two each year in military flight tactics would better serve the national defense at less cost than anything the government could do. No doubt any transport company would arrange to relieve their pilots at various intervals throughout the year for this purpose. Military fields and equipment could be used, which would hold the cost down to almost nothing.

ERNEST METCALFE,
Virginia, Minnesota.

[A very good thing, to our way of thinking. The Army and Navy are not deriving as much benefit as they should from those who become pilots without going through a military or naval primary flying school.—Ed.]

Editorial Comment
FROM THE DAILY PRESS

What the Airport Needs

THE ADMINISTRATION BUILDING at the airport will be dedicated next Monday.

There is a lot of talk about what the airport needs. The fact is that the park commission, under Chairman Long, has done a great deal with the money it has had at its disposal.

What the airport needs is some central information service at the new building to be dedicated Monday. As it is, a person goes to the field, roams about and does not know where to get any information.

It would be a good plan to have the city appoint a public relations officer to whom visitors to the airport could go, or who could give information by telephone. This officer would have all the facts necessary.

We suggest somebody who knows about flying, somebody with the brains and personality to handle such an important job. —BOSTON TRAVELER.

New Volumes
FOR THE SHELVES

Navigation

THE NAVIGATION OF AIRCRAFT, *by Lieutenant Logan C. Ramsey, U. S. Navy; Ronald Press Company, New York City; Price $4.50.*

THIS 234-page book with 50 illustrations covers in a logical way the subject of Aerial Navigation, or, as the author terms it, "Avigation." Well arranged as to subject matter, and amply indexed, it meets a timely need.

The aim of the book is to draw a proper balance between the three major branches of air navigation, Piloting, Dead Reckoning, and Celestial Navigation, and this aim is clearly stated in the Introductory chapters. Generally speaking, the author attains his ends and places before the public a book which will render a great service.

A valuable feature is the inclusion of more than 175 review questions and problems. The problems worked out include practical and interesting examples likely to be met with by the aviator any day. The author is an aviator of experience, and is also qualified in marine navigation.

The interesting fact is brought out that while pilots in general, prefer to navigate solely by piloting, since their claim is that it is more "practical"; and while theorists in general prefer celestial navigation since it fits into their scheme of things; the most important subject of all is the neglected part of air navigation, Dead Reckoning. To quote, "Dead Reckoning may and can be used advantageously in conjunction with navigation by Piloting, and must be used in connection with navigation by Aerial Astronomy. Hence Dead Reckoning is universal in application. . . . and is the most important branch of aerial navigation."

The importance of plotting is stressed, though it is not admitted how very little of this is done in practice. The airman's trinity is given as, "compass, ground speed, and altimeter", and these involve plotting.

The greatest single problem in air navigation is stated as being that of "determining the wind." The wind effect on a plane is compared with the effect of ocean currents on a ship, and the word "flyings" is coined to parallel the mariner's "sailings". The use of traverse tables is discouraged, on which point the reviewer is in thorough agreement. Ramsey puts it thus: "As is so often the case in aerial navigation, the graphical method is practically imposed upon the avigator because it is simple and rapid."

The important subject of radio is not sufficiently stressed. It might be added, however, that some important developments in this subject have been made since the book went to press.

The point is brought out that celestial navigation with the aircraft sextant may be done throughout the night, instead of at twilight alone as is the case with a mariner's sextant. This is an important fact, since at night Piloting and Dead Reckoning become more difficult, and at that very time celestial navigation is at its best.

The author advocates the use of the Aero-Chronometer, or second-setting navigation watch. However, he also suggests that a stop watch be used with them. In this the reviewer does not agree, since experience has shown that time as furnished by the Aero-Chronometer is the one part of air navigation which has been "licked". The sidereal watch affords a check on the civil time watch, and radio may be used daily to check both of them.

The meat of celestial navigation is the "line of position". While stating that this branch of air navigation is not at present as important as other branches, notably Dead Reckoning, nevertheless 70 pages is devoted to this subject. Numerous problems are given. In an effort to cover the entire subject, several different methods for computing the altitude are given, then the author concludes that only two or three of the methods named and described are practicable. The reviewer believes that the author should have made the decision as to what is the best method, and omitted lengthy discussions of other methods which are little used, even for marine navigation. There are numerous methods for working the line of position, yet on a canvass of 24 naval ships during Fleet Concentration only three methods were found to be in use. Of these 24, 19 used either the Line of Position Book, or the similar book, H.O. 208 (Dreisonstok, which is mis-spelled, "Dreidenstock"). The other 5 ships used the Cosine-Haversine method.

The author draws a distinction between the Line of Position Book and H.O. 208, while in fact the difference is merely that between "tweedledum" and "tweedledee",—same idea, same size, and largely the same figures. The method for finding the azimuth is the principal difference, and this is not the important part of the operation. The reviewer naturally favors his own "child", the Line of Position Book, some of the reasons for this preference being that it is less than half the size of the other book, and has more convenient auxiliary tables, including a separate column giving the "bubble" correction. Also, the principal operation, that of computing the altitude, is done in a more direct manner, and this is the meat of celestial navigation. However, both books are popular, and the choice in this case is immaterial, since to learn one makes the other come easy. The use of Bygrave's Slide Rule is also advocated, yet since either of the books mentioned do the same thing more accurately and in nearly the same time, and further, afford a record of the work which the slide rule does not, it is difficult to see the advantage of the more expensive and cumbersome slide rule. If the latter is used, one must still have some recourse to auxiliary tables.

The author sums up the two principal problems of navigation, that of determination of the direction and the correct distance traveled as follows: *"These two features, the physical skill required to keep the nose of the plane pointing in the proper direction and the mental ability to determine that proper direction, are, in the final analysis, the essentials of the navigation of aircraft. All other factors and methods are adjuncts and subordinate to these two."*

Or to paraphrase, *the problem of air navigation is the proper handling of direction and distance.*—P. V. H. WEEMS, *Lieut.-Commdr. U.S.N.; inventor of the Weems systems of rapid navigation.*

Abstracts AND *Reviews*

Safer Flying

WHAT THE PILOT REALLY NEEDS; *by A Long-distance Pilot; article in* Aircraft Engineering, *Dec., 1929.*

DIFFICULTIES likely to be encountered by a transport pilot are listed by the author in the following order of importance: (1) mechanical failure; (2) meteorological conditions; (3) navigational problems; (4) piloting difficulties. He then presents his opinions, as an R.A.F. pilot with considerable experience in long-distance flying, of the most desirable methods of overcoming these difficulties. A footnote explains that he has not tried to limit himself to suggestions commercially possible at present; but, in the main, he advocates only further

development of certain projects which are already in the experimental stage or beyond.

First, he strongly urges the use of multi-engined planes, preferably three- or four-engined planes capable of maintaining altitude on any two. And with this equipment, he recommends an emergency landing field every 25 mi. when possible. If the airplane has good brakes as well, mechanical difficulties under normal conditions should not be dangerous.

Weather reporting service by radio is essential, in the view of the author. And it should be supplemented by a system of ground signal communication for use in emergencies. Low clouds, fog, dust storms and snow are listed as the only serious dangers, and it is suggested that there should be no excuse for failure to avoid them if the service is properly organized.

The problem of navigation is treated at considerable length. The author feels very strongly that chief pilots should all be skillful navigators, and should habitually lay their course by navigational methods rather than by watching landmarks. Thus, instead of being forced to fly low because of poor visibility, they will immediately seek altitude in poor weather and fly blind, avoiding all danger of running into unexpected obstacles.

But if the pilot is to be an expert navigator, he must be provided with adequative facilities. At this point, the author's ideas are most at variance with current practice. In the first place, he says, the pilot must be comfortable. He must be able to move about, have easy access to all instruments, and have at least a small table on which to spread his charts and log book. Obviously, then, he should be relieved of the worry and strain of actually flying the plane except in taking off and landing, either by having a second pilot or an automatic pilot. "It is no less absurd," says the author, "to see a first pilot tied to the controls today—once his aircraft has settled onto her course—than it would be to see the captain of the *Mauretania* twirling the wheel in the wheel-house, whilst a deck hand thumbed out the navigation in the chart room."

With these advantages, the author believes, a skilled pilot should always be able to reach an emergency field, even under the most difficult circumstances; and with proper facilities should be able to feel his way down, with the aid of wireless, beacons and flares, in all but the very worst conditions.

Ground strips of small flags on the airport are recommended, to help the pilot in judging when to flatten out. When such equipment as leader cables, balloon buoys, sensitive altimetetrs and sonic sounding machines is further developed, there should be a fair possibility of making a safe landing even in fog or snow.

New Patents

Oscillatory Type Aircraft Engine

1,744,542. INTERNAL-COMBUSTION ENGINE. FRANK E. GOUGH, Oklahoma City, Okla., assignor to Gough Aircraft Corporation, a Corporation of Oklahoma. Filed June 27, 1929. Serial No. 374,228. 12 Claims. (Cl. 123—18.)

AN OSCILLATING piston is intended to drive a propeller shaft through a universal joint and crank-shaft. The crank-shaft is mounted at an acute angle and is slidable in a direction at right angles to the axis of oscillation to vary the extent of oscillation and, therefore, the degree of compression. The purpose of this adjustment is to permit the amount of fuel drawn into the combustion chamber to be varied in accordance with factors such as change of altitude.

• • •

Detachable Ski for Seaplanes

1,745,126. DETACHABLE SKI. ARTHUR RALSTON STALB, JR., Farmingdale, N. Y. Filed May 9, 1928. Serial No. 276,289. 4 Claims. (Cl. 244—2.)

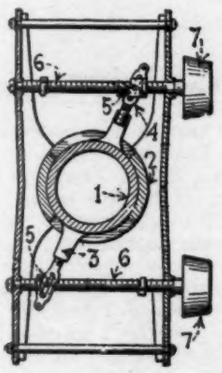
SKIS ARE MOUNTED on the under surface of seaplane pontoons for the purpose of enabling the craft to land on snow or ice. The skis operate in channels formed by two spaced plates at each side fixed beneath the pontoons. Each ski is pivoted at its front end in the plates, and at several points along its length is connected to the craft through yielding connections, for the purpose of absorbing landing shocks. Each connection includes a cylinder carried by the craft and sliding within a tube carried by the ski, with rubber bands or pads interposed between flanges formed on the cylinder and sleeve.

• • •

Variable Pitch Propeller

1,744,905. AEROPLANE PROPELLER. JOSEPH S. KILLEEN, New York, N. Y. Filed July 12, 1928. Serial No. 292,119. 10 Claims. (Cl. 170—163.)

EACH PROPELLER is provided near its base with arms at opposite sides extending radially through the socket in which each blade is mounted. These arms are pivoted on nuts which travel on threaded screws. When the screws are rotated the nuts are intended to travel in opposite directions to rotate the propeller blade within its socket and thus change its pitch. For rotating the screws there is provided a cone-shaped pulley on each screw, and rings are designed to be moved into engagement with the pulleys so as to



The illustration shows propeller blade 1, socket 2, arms 3, 4, nuts 5, screws 6, pulleys 7

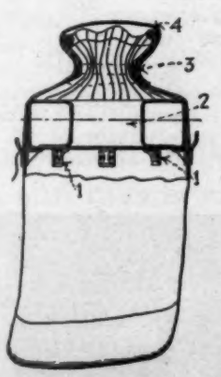
be tangent at their outermost and innermost points. The pilot may move one or the other of the rings into engagement with the pulleys through a handle and cables which rotate one ring or the other in contact with a fixed cam which moves the ring so rotated into engagement with the pulleys.

• • •

Mail Bag for Aircraft

1,744,719. MAIL BAG FOR AIRCRAFT. WILLIAM E. BERRY and MICHAEL VUKOVICH, Columbus, Ohio. Filed June 5, 1928. Serial No. 283,022. 2 Claims. (Cl. 150—13.)

TO PERMIT a mail bag to be dropped safely into a body of water, the bag is provided with interior brackets which support a hollow, air-tight ring. The neck of the bag is intended to be



The illustration shows interior brackets 1, hollow ring 2, strap 3 and rubber cap 4

closed by means of a strap passed through exterior brackets. It is stated that a parachute may be fastened to these brackets before a bag is dropped. A rubber-cap is designed to be drawn over the closed neck.

THE BUYER'S LOG BOOK

Gruss "B" Struts

PRODUCTION is now under way in the new Los Angeles factory of the Gruss Air Spring Company of America, Ltd., on the new series "B" Gruss Air Strut shock absorber unit for aircraft landing gears, which supersedes the "A" series formerly manufactured by this firm.

These shock absorbers are manufactured in stock sizes suitable for planes having gross weights of from 1,000 to 25,000 lb. They are manufactured as complete units, ready for installation, being provided with proper anchorage connections and a newly developed aluminum fairing of high aerodynamical efficiency and exceedingly neat appearance.

New Gruss Mark "B" Air Strut

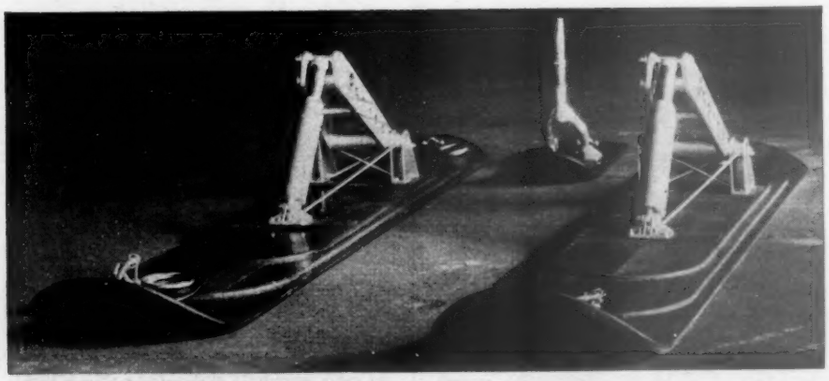
Gruss Air Struts are constructed on the oleo-pneumatic principle. A landing and taxiing cushion of air, combined with a positive oleo-hydraulic recoil and rebound check, gives efficient shock absorption and smooth riding qualities when the plane is in contact with the ground. A new patented packing adjustment and oil compensator is embodied in the series "B" struts, the action of which is entirely automatic and needs no adjustment. This feature compensates for packing wear and prevents leakage of oil or air at any time. The oil compensator further acts as a safeguard to the strut unit in automatically returning oil to the internal reservoir whenever the plane leaves the ground. Through the use of high strength alloys, and by more compact and precise design and construction, it has been possible to reduce the weight of the new series "B" struts as much as 35 per cent over that of former models of equal capacity.

The new series "B" Gruss Air Struts are manufactured complete in a new factory at Los Angeles, completely equipped with the latest types of production machinery, with all manufacturing processes conducted under the closest supervision, with rigid inspection to assure manufacture to very close limits and the production of mechanically correct and reliable shock absorbing units for all types of planes.

G. E. Ceiling Indicator

A RECENT PRODUCT of the General Electric Company, Schenectady, N. Y., is a ceiling height indicator to be used in connection with the 14 in. Novalux ceiling light. Its purpose is to simplify the process and make possible a quick determination of the ceiling height without requiring actual measurement. The indicator should be located 500 ft. from the location of the ceiling light with the light permanently tilted at an angle of 63 deg. 26 min. In determining the height of the ceiling it is than necessary only to sight along the indicator arm, moving it until it points directly to the reflection of the light beam on the ceiling, and the height may be read directly in feet from the graduations on the scale.

The construction is of non-corrodible material with direct and inverted V-shaped sights to facilitate reading. Leveling screws are provided so that the unit can be properly adjusted on a 4 in. pipe support. The weight is 62 lb.



Shock Absorbing Skis and Tail Skid

TRADE CATALOGS

SAUTER TIME SWITCHES. R. W. Cramer & Company, Inc. has just issued a catalog illustrating the use of Sauter Time Switches in turning "on" and "off" electric circuits. The first part of the booklet is composed of five sections, each section being devoted to photographs, wiring diagrams and detailed specifications of a certain type of switch. The latter half contains a series of bulletins which describe the clocks used and illustrate specific applications of the different switches, including a type for use on aircraft beacons.

INTERCHANGEABLE BEARING. The Federal-Mogul Corporation presents the advantages of a new interchangeable bearing in a recent 12 page booklet entitled "How to Eliminate 10 Bearing Assembly Operations." This includes an outline of the steps in the installation of line-ream bearings and interchangeable bearings, with illustrations of the bearing and the interior of the factory.

BARLING NB-3. The various distance, altitude and racing records made by the Barling NB-3 plane are listed in a folder recently issued by the Nicholas Beazley Airplane Company, Inc. The advantages of the plane as a light type of aircraft are discussed.

KITTYHAWK B-4. The Viking Flying Boat Company has recently published a folder giving performance data and specifications on the Kittyhawk Model B-4. The principal features in the construction are illustrated by a series of photographs.

Oildraulic Skis

THE OILDRAULIC SKIS recently developed by the Aircraft Products Corporation, 7424 Melville Avenue, Detroit, Mich., employ a junior oildraulic shock absorbing unit to take care of the landing shock usually absorbed by the airplane tire. The skis are built in three standard sizes known as the Junior, Senior and Transport. The Junior model is for use on planes weighing between 2,500 and 4,000 lb., the Senior for planes weighing 4,000 to 6,000 lb., while the Transport is usually in "batteries" and provides for planes ranging in weight between 10,000 and 13,500 lb. The skis are 9 ft. long and 18 in. wide, the surface varying as the weight of the plane. The shock unit has a travel of 6 in. Only wooden runners are recommended by the company since metal runners are believed to freeze to the ground too frequently on ice or snow.

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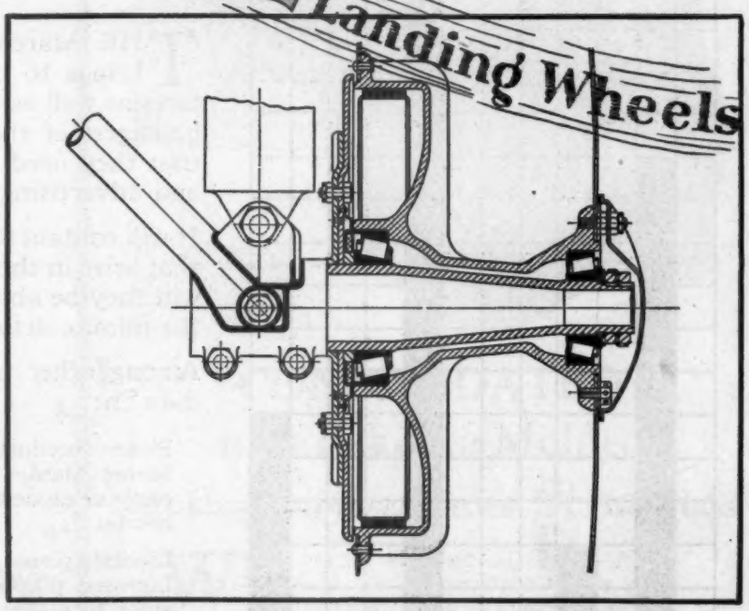

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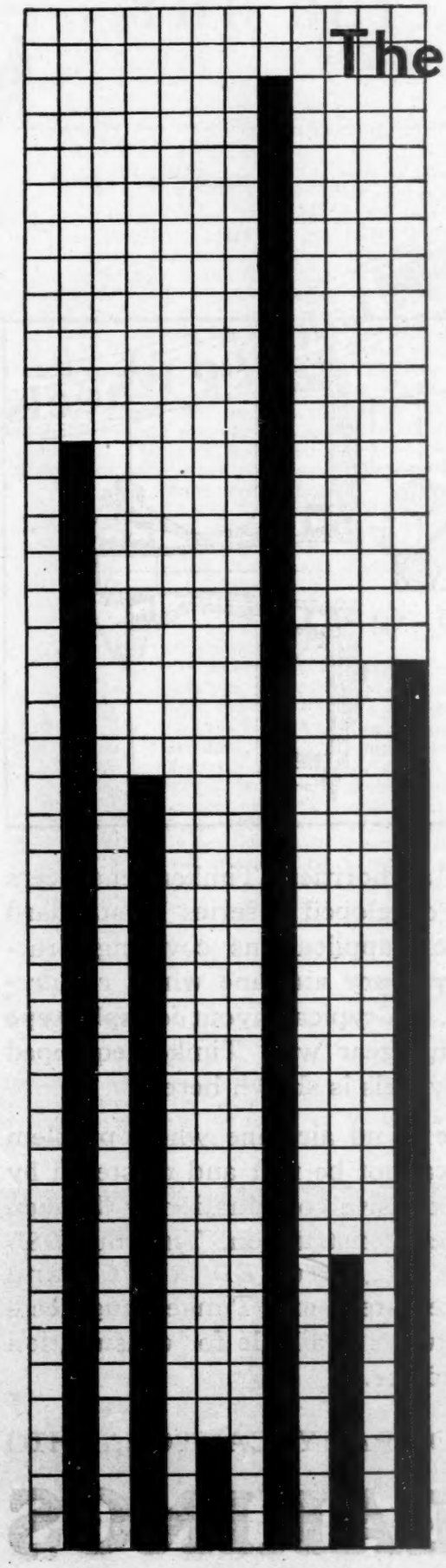

The Aviation Industry *needs these* Facts

THE March 22 Statistical Issue of Aviation brings to the engineering, production executives as well as the sales managers and advertising managers of the aviation industry the very facts that they need in planning their production, sales and advertising programs.

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Military and naval aircraft development.

Aircraft and engine exports, by number and valuation.

Expenditures by foreign governments and foreign air transport operations.

Such intensive reader interest as this particular issue is bound to have is sure to make it a valuable advertising medium. Advertisers will do well to use their most effective advertisements in this issue not only for its practical use, but also because of its year-round reference value.

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AEROL shock absorbing STRUT

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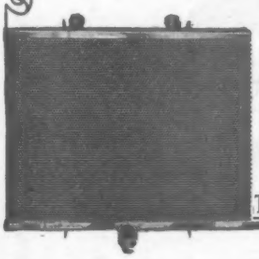

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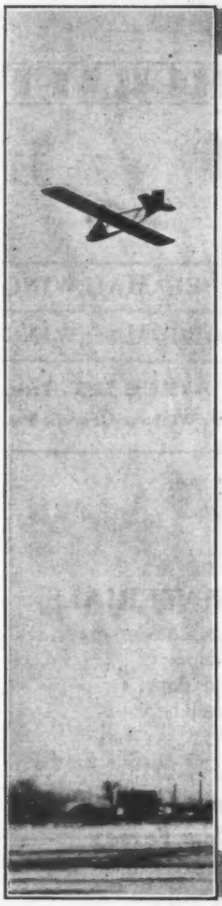

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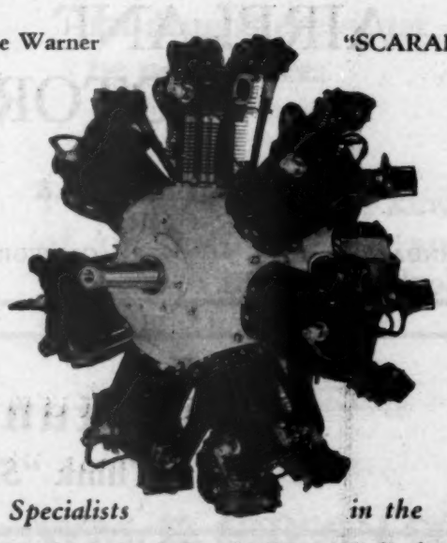

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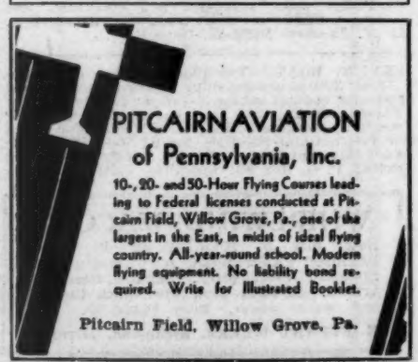

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(Continued on Page 16)

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Fairchild	5 pl. Cabin Mono	Wright J-5	NC-4440	328	3,900	Louisville
Fairchild	5 pl. Cabin Mono	Wright J-5	NC-3569	206	3,500	Valley Stream
Fairchild	5 pl. Cabin Mono	Wright J-5	NC-3315	108 (Eng.)	4,000	Boston
Fairchild	Photo Mono	Challenger	NC-4755	108	3,800	Valley Stream
Fairchild	5 pl. Cabin Mono	Wright J-5	NC-3569	9 (overhauled)	4,000	Pittsburgh
Command Aire	3 pl. Open Bi	OX-5	M-931	87	1,965	Portland
Command Aire	3 pl. Open Bi	OX-5	NC-480-E	118	1,810	Baltimore
Command Aire	3 pl. Open Bi	OX-5	NC-584-E	5	2,375	Bridgeport
Command Aire	3 pl. Open Bi	OX-5	NC-582-E	342	1,200	Miami
Ireland	Amphibian	300 Whirlwind	NC-109-H	102	17,090	Rockland
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(Continued from page 14)

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FOR SALE: French Hispano 220, complete, 100 hrs., $100. Used type A crank shaft, $5. German Bosch DV8 new points, A-1, $15. Robert G. Flinn, 201 Cimorron, La Junta, Colo.

ONE Waco model 10 with Hisso 180 model E, 135 hours. Bendix wheels and brakes, airspeed indicator, special cowling, black fuselage and orange wings. One OX-5, Waco model 10, 350 hours. Green fuselage, silver wings. Two OX-5 Waco model 10. 145 hours each. Blue fuselage, silver wings. Ships look like new. Shockley Flying Service, Kokomo, Indiana.

OX-5, Waco 9, A-1 shape, recently painted, overhauled and reconditioned, never cracked-up, $1,200. Burt Binge, 5733 Chalmers, Detroit, Michigan.

PARACHUTES, new and used, rope ladders for stunt men, etc. Specify weight. Thompson Bros. Balloon and Parachute Co., Aurora, Illinois. Established 1903.

PITCAIRN with Curtis OXX-6 motor just overhauled. License NC-978. Price $1,500. Will be sold to best satisfactory bidder before March third. Miller Corp., New Brunswick Airport, New Brunswick, N. J. Tel. 4392.

RYAN Brougham in good condition, motor recently overhauled. Bargain price. Cleveland Pneumatic Tool Co., Cleveland, Ohio.

USED OX-5 Prop. $15, 80 LeRhone propeller $15, Zenith Altimeters $9.50, turnbuckles 4¼ in. 15c (ea.) Speeditex "B" glider fabric 30c yd., Grade "A" cotton 35c yd. Joe Edeskuty, Aircraft, 1727 11th Ave. So. Minneapolis, Minn.

WILL pay cash for late model planes and motors, what have you to offer. Aircraft Brokerage Company, 2145 No. Talbot Avenue, Indianapolis, Ind.

WILL take good three place biplane and cash in trade, on my J-6, 165-Waco demonstrator, less than 50 hours. Ship has special paint, steel prop., Gruss struts, brakes, navigation lights, air speed, special cushion. Positively can't be told from new, cost $6,750. Need money and will make real proposition, for quick action. Write or wire William J. Ashley, 236 West Main Street, Ft. Wayne, Ind.

EQUIPMENT WANTED

WANTED converted Henderson, airworthy and dirt-cheap. A. Wartmann, 2804 West 64th Street, Chicago, Ill.

WANTED—Full set of Oriole wings. Wings must be in perfect condition throughout. State lowest cash price in first letter. Dominic Esposito, 170 Swan St., Hornell, N. Y.

WANTED: Waco 10, OX-5, flyway or a licensed ship, less Hisso motor, will trade Packard 6 coupe, 1925, balance cash. Write A. W. Baorley, Ellsworth, Wisconsin.

WANTED American Circus motor, will consider other late makes from 90 to 125 h.p. in most any running condition. Quality Garage, Clearwater, Florida.

POSITIONS VACANT

A COMPETENT ground instructor who now holds or can pass examinations for licenses on all subjects taught in a government approved flying school is needed by the Yellow Cab School of Aviation, Des Moines, Iowa. If interested write giving experience and salary expected.

AIRPLANE inspector familiar with light wood and metal construction. Also a Final Assembly Rigger familiar with Streamline Wire Rigging. P-433, Aviation, 520 N. Michigan Ave., Chicago, Ill.

ENGINEERS and draftsmen. Leading aircraft manufacturer can use services of practical, experienced engineers and draftsmen. P-357, Aviation, 520 No. Michigan Ave., Chicago, Illinois.

This Is The Center

for the advertising of all kinds of business opportunities in the aeronautical field.

Whether you want a propeller, a motor or a complete airplane. A position, high class help, a business partner or an airport, an advertisement in the Searchlight Section will help you.

All inquiries answered promptly.

Address

SEARCHLIGHT DEPT.
Tenth Ave. at 36th St.,
New York City

POSITIONS VACANT

PROPELLER manufacturer desires engineer experienced in propeller design for part time work. Give references and details regarding experience. P-434, Aviation, 520 N. Michigan Ave., Chicago, Ill.

POSITIONS WANTED

AERONAUTICAL engineer with long experience on design and structures available in February. Competent and with several approved type airplanes to credit. PW-418, Aviation, 520 No. Michigan Ave., Chicago, Ill.

AIRPORT manager desires connection. Capable operating and building business, experienced all branches of aviation, excellent record student and passenger business. Airphoto, 2224 Fox Hills Dr., Los Angeles, Calif.

AUDITOR and cost accountant desires new connection. Now with airplane manufacturer. Age 33. 10 years' experience. PW-435, Aviation, 520 No. Michigan Ave., Chicago, Ill.

LIMITED Commercial Pilot. Yale 1928, no smokes, no drinks, no wives. A. H. Stevens Jr., 111 Murray Ave., Larchmont, N. Y.

POSITIONS WANTED

TRANSPORT pilot, age 25; student instruction, cross-country and sales experience. Indifferent to location. PW-426, Aviation, Tenth Ave. at 36th St., New York.

TRANSPORT pilot, age 22, married, four hundred certified hours, cross country instruction, barnstorming in high altitudes, clean record, excellent references, open, closed ship ratings. M. Remender, 807 South 3rd Street, Norfolk, Nebraska.

TRANSPORT PILOT, licensed airplane and engine mechanic, experienced in cross-country and student instruction. Will fly for living expenses. Excellent references as to ability and character. L. O. Sabine, Gaithersburg, Md.

SALESMEN WANTED

WANTED, sales promotion men to introduce the Alexander line of gliders and airplanes. Several profitable plans are open to fliers and non-fliers who can sell. In some cases demonstrators and drawing accounts will be furnished. An opportunity is offered to break into the most profitable branch of aeronautics and to prepare yourself to make $10,000 or more per year with little or no initial capital. Send your qualifications to Alexander Aircraft Company, Room 11, Colorado Springs, Colorado.

SALESMAN AVAILABLE

SALES executive seeks new connection. Graduate mechanical engineer, specialist in Industrial Advertising and Sales Promotion. Competent in Sales Analysis, establishing advertising objectives and reaching them through market research. Capable in analysis of territorial distribution and establishment of sales quotas. Can combine functions of Public Relations Counsel with advertising activities. At present in New York. SA-428, Aviation, Tenth Ave. at 36th St., New York.

MISCELLANEOUS

GERMAN glider blueprints $3.00. Turnbuckles 15c. Wobble pumps $10.00. 2 pairs goggles $1.00. Altimeters $3.50. Propellers $5.00. Marvin Northrop, 730 Washington North, Minneapolis, Minn.

Unusual Aeronautical Opportunity

The Major Aircraft Corp. will accept and train for executive and other aircraft positions a limited number of men and young men.

An unusual opportunity is open to those who, after a short training period in our factory, can meet with our requirements. Training fee required; interviews 9 a.m. to 9 p.m. all week or write to

MAJOR AIRCRAFT CORPORATION
45 West 45th St., New York City, N. Y.

If you are really interested in Aviation—will you accept a free membership to the AVIATION SERVICE LEAGUE? We want 100,000 members to promote aviation. If you are over 18 years of age send for free membership. Positively no obligation.

AVIATION SERVICE LEAGUE,
823-A 56th Street Milwaukee, Wisconsin

Sales Representative

An aircraft manufacturing company located in New York City requires the services of responsible sales agents to represent them in the selling of planes and instructions. Territory protected. Must be financially responsible.

Major Aircraft Corporation
45 West 45th Street, New York City

WELL established concern, supplying the aircraft industry, desires to take up immediately the sale of additional aircraft commodities as direct manufacturer's representative.

RA-431, Aviation
520 N. Michigan Ave., Chicago, Ill.

The Aircraft Riggers Hand-book

Written by a mechanic for the mechanic. Tells how to align, check, and inspect airplanes. Tells also how to "trouble shoot" performance. A new light for the student. A true guide for the mechanic. Handsomely bound in gold stamped flexible binder, $2.50 postpaid.

J. R. CARROLL
1302 N. Broadway, Urbana, Ill.

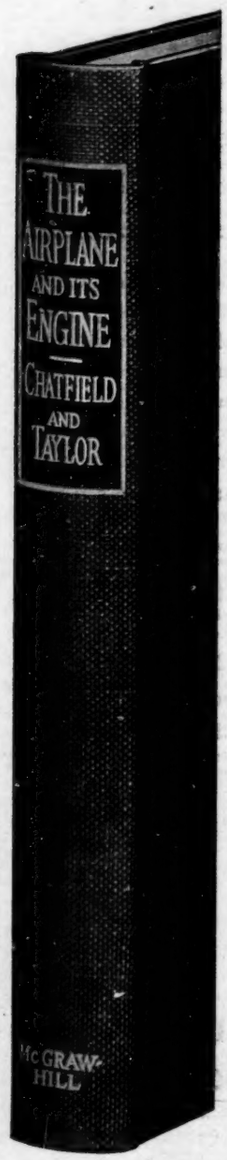
It's Direct—

THE SHORT WAY between the man with Aviation equipment to sell, and the buyer, is Aviation.

When you have idle equipment to dispose of, advertise it in the Searchlight Section of Aviation. No trouble; no delay.

Address
SEARCHLIGHT DEPT.
10th Ave. at 36th St. New York City

AIRPLANE MECHANICS



Fundamental factors to be considered in design, construction and control of heavier-than-air craft.

The Airplane and Its Engine

By C. H. CHATFIELD and C. F. TAYLOR

Associate Professors in the Course in Aeronautical Engineering at the Massachusets Institute of Technology.

HERE is a sound, clear and simple discussion of the fundamental principles, construction and capabilities of the airplane and its engine. The book strikes a mean between the simple "popular" aviation books and the highly technical works for the designing engineer.

Little mathematics has been used, and only a knowledge of elementary physics and mechanics is required. There are 209 photographs and diagrams.

the book covers such topics as:

—the lift of a wing—developing the theory from Newton's laws of motion
—the reason for wing shapes
—Monoplane and biplane arrangements
—Resistance of air to bodies in motion and airplane shapes designed to reduce this resistance
—Stability and airplane control
—the engine-basic principles and representative types
—the complete power plant
—construction of the modern airplane
—types of airplane, airplane instruments and accessories.

379 pages, 5½ x 8
209 illustrations, $2.50

SEE YOUR COPY FOR 10 DAYS FREE

Simply mail the coupon for your copy. No obligation to purchase—no agents—no red tape. Keep the book or send it back as you wish. It's one book every aviation man should have. Don't miss this chance to see it free.

MC GRAW-HILL
FREE EXAMINATION COUPON

McGraw-Hill Book Co., Inc., 370 Seventh Ave., New York.

Send me Chatfield and Taylor's THE AIRPLANE AND ITS ENGINE, $2.50, for 10 days' free examination. I agree to return the book, postpaid, in ten days or to remit for it then.

Signed .....

Address .....

City and State .....

Official Position .....

Name of Company .....

(Books sent on approval in Continental U. S. and Canada only.) A. 2-22-30

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SCINTILLA

AIRCRAFT MAGNETOS

Are Selected Because of Their

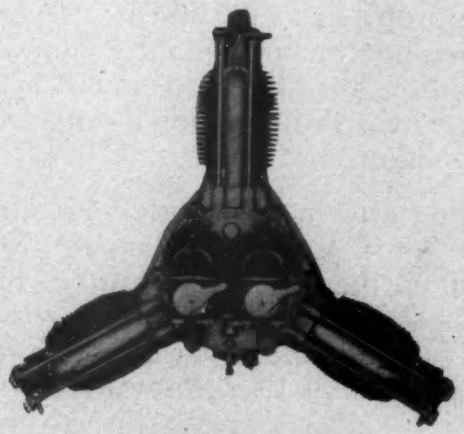
DEPENDABILITY
SIMPLICITY
ACCESSIBILITY

Scintilla Aircraft Magnetos can be obtained for engines of from one to eighteen cylinders.

Scintilla Aircraft Magnetos are Standard Equipment on Aircraft Engines Built by

Aero Development Co.
Aeromarine Plane & Motor Co.
Aeronautical Products Corp.
Aircraft Holding Corp.
Airman Engineering Co.
Alliance Aircraft Corp.
American Cirrus Engines, Inc.
Axelson Aircraft Engine Co.
Brownback Motor Laboratories, Inc.
Century Rotary Motor Corp.
Comet Engine Corp.
Continental Motors Corp.
Cross Gear & Engine Co.
Curtiss Aeroplane & Motor Co.
Fairchild Airplane Mfg. Corp.
Fischer & Jacobs, Inc.
General Airmotors Company
Hu ricane Motor Co., Inc.
Kinner Airplane & Motor Co.
Lambert Aircraft Engine Corp.
(Formerly Velie Motors Corp.)
Light Mfg. & Fdry. Co.
Lycoming Mfg. Co.
MacClatchie Mfg. Co.
Marchetti Motor Patents, Inc.
Menasco Motors Company
Michigan Aero-Engine Corp.
National Aero Corp.
Packard Motor Car Co.
Quick Air Motors Co.
Rocky Mt. Steel Products, Inc.
Spartan Aircraft Co.
Szekely Aircraft and Engine Company.
The Kimball Aircraft Corp.
The Le Blond Aircraft Engine Corp.
The Pratt & Whitney Aircraft Co.
Tips and Smith, Inc.
Warner Aircraft Corp.
Western Enterprise Corp.
Wright Aeronautical Corp.
Wright-Tuttle Aircraft Motors Corp.

One of a number of American Aircraft Engines equipped with Scintilla Aircraft Magnetos



SZEKELY SR-3
Made by Szekely Aircraft and Engine Co.

SCINTILLA PARTS DEALER SERVICE STATIONS

CHICAGO, ILL.
Illinois Auto Electric Co.
2450 Calumet Ave.

NEW YORK CITY
Manhattan Ignition Corp.
206 W. 68th Street

DETROIT, MICH.
Greenleaf, Inc.
3127 East Jefferson Ave.

PHILADELPHIA, PA.
J. W. Perkin, Jr., Ignition Specialist
2251 N. Broad St.

LOS ANGELES, CALIF.
Pacific Airmotive Corp.
3417 Angeles Mesa Drive

TULSA, OKLA.
Magneto Ignition Corp.
304 E. Second Street

W. PALM BEACH, FLA.
Sutcliffe's Automotive Electrical Service Co.
Corner First and Olive Sts.

SCINTILLA MAGNETO CO. Inc.
SIDNEY - NEW YORK
Contractors to the U.S. Army and Navy

This is one of a series of advertisements directed originally to advertising men in an effort to make general consumer advertising more profitable to buyer and seller. It is printed in these pages as an indication to readers that McGraw-Hill publishing standards mean advertising effectiveness as well as editorial virility.

Getting the cart
(*distributor*)
BEHIND the horse
(*consumer*)

"A" and "B" are manufacturers of high grade radio sets. Both are seeking national distribution.

"A" appropriated $400,000 in 1928 for an advertising campaign in general mediums to create distribution through consumer demand. He by-passed the dealer—didn't consider his selective function.

"B" went after it differently. He appropriated $125,000 for general consumer mediums and $25,000 for the papers of his trade. He intended to create distribution direct and along with consumer demand. He recognized that if the dealer had a place in his sales program then the dealer's magazine had a place in his advertising program. *Radio Retailing* was used as his key paper.

A recent accounting shows that "B" sold three times as many radio sets as "A" during 1928.

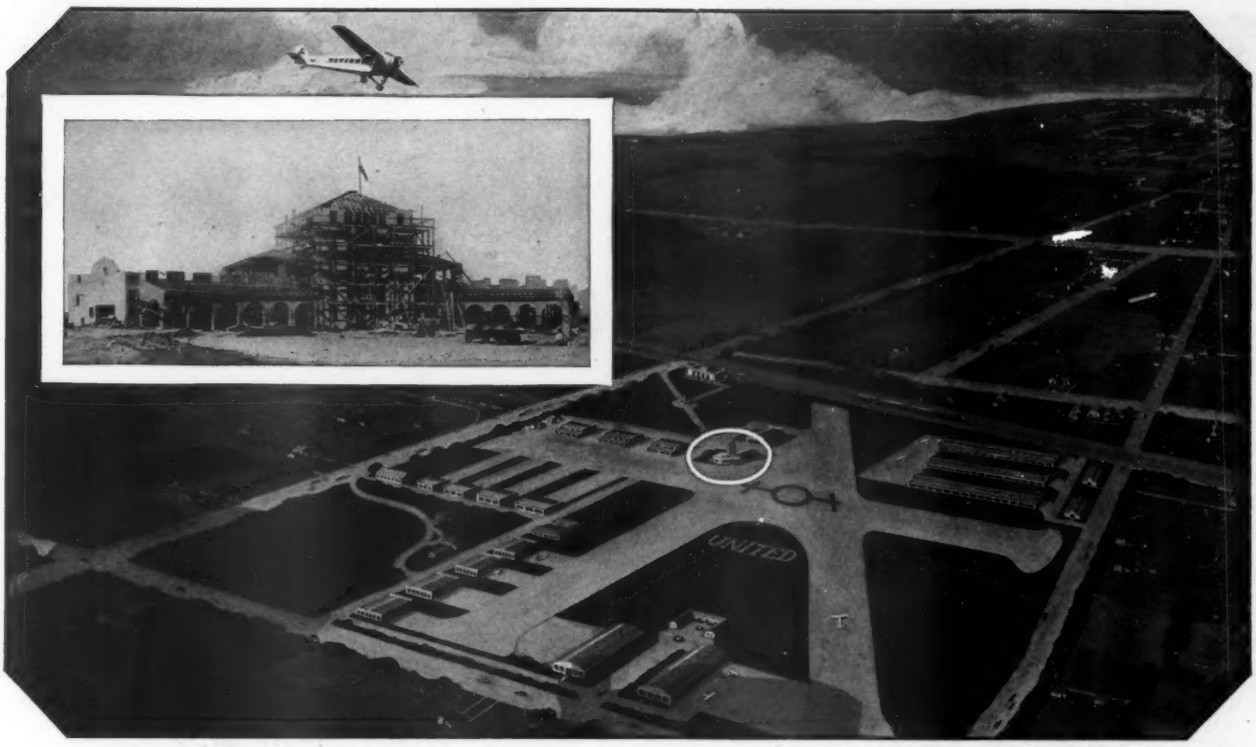
There are some advertising men like "A" who earnestly believe that consumer demand by itself automatically organizes distribution. Over a long period it may possibly do so. But what about the manufacturer who cannot afford the long-haul expense—the manufacturer who must seek his profits from economies in marketing as well as production economies—the manufacturer beset with serious price competition?

The wrong use, the improper balance of advertising has often turned users of advertising into foes or skeptics. It is not a question of one type of medium in preference to another but a matter of common-sense principles of merchandising. With these understood and applied an effective, economical program of advertising is inevitable.

McGRAW-HILL PUBLICATIONS

New York Chicago Cleveland Detroit Philadelphia St. Louis
Greenville San Francisco Boston London

F-10



United Airport of Boeing System at Los Angeles. Layout, design and construction by Austin. Inset shows air depot practically completed.

AN ADVERTISEMENT TO 1,100 AIR-CONSCIOUS CITIES

FROM no less an authority than the United States Department of Commerce comes the statement that 1,100 cities are organizing committees and otherwise preparing for construction of airports to gain the advantages of air commerce.

If yours is one of these air-conscious cities . . . if you are in any way interested in the aviation program of your municipality or contemplating like development for your own organization . . . Austin offers its experience as a definite aid in the planning and construction.

For more than a decade, Austin has been active in the field of aviation. Selection of sites, design and construction of complete airports and terminals, hangars and industrial plants for the manufacture of aircraft and accessories . . . all of these have been a part of Austin's work.

If your city or your business is to play a vital part in the nation-wide development of aeronautical facilities, let the first step be to secure an Austin Survey and Report. This is the sound and economical way of planning your project, for this unusual Austin service presents the findings of Austin Airport Engineers in a manner that clearly points out the proper course of procedure to assure maximum return on your airport investment.

Any of the Austin offices listed below are at your call. 'Phone, wire, or use the convenient memo below.

THE AUSTIN COMPANY

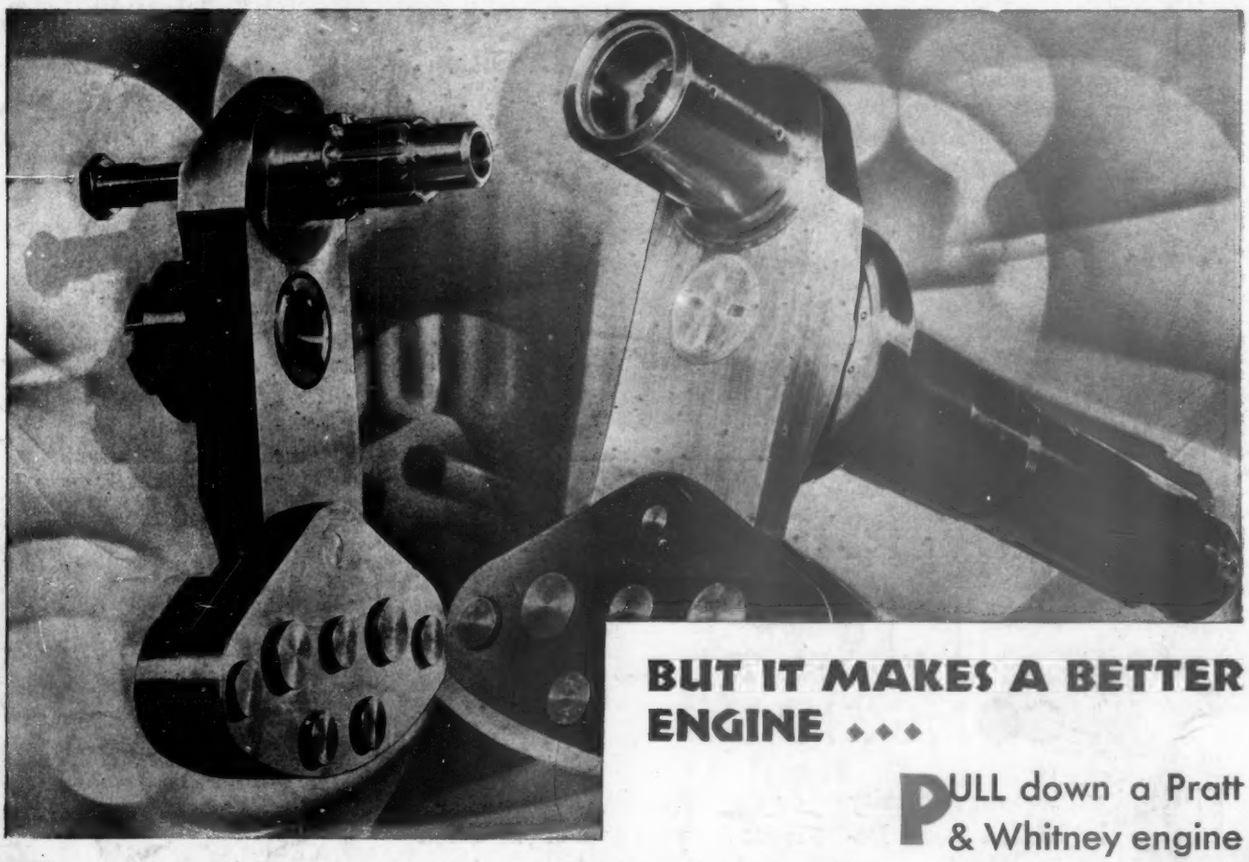
Airport Engineers and Builders ▾ **Cleveland**

New York Chicago Philadelphia Newark Detroit Cincinnati Pittsburgh St. Louis Seattle
Portland Phoenix The Austin Company of California Ltd.: Los Angeles, Oakland and San Francisco
The Austin Company of Texas: Dallas The Austin Company of Canada, Limited

Memo to The Austin Company, Cleveland—We are interested in ☐ Airport (Municipal) (Private) containing ..... acres. ☐ Hangar ..... x ..... with ..... ft. clearance. ☐ Factory approx. ..... sq. ft. Name .....

Position ..... Firm ..... City ..... A 2-22-30

THIS SPLINED CRANKSHAFT COSTS MORE TO BUILD . . .



BUT IT MAKES A BETTER ENGINE . . .

PULL down a Pratt & Whitney engine and you find workmanship worthy of a Swiss watch. The two piece splined crankshaft is an outstanding example of this. The two sections are bolted directly through the crank pin, making for rugged strength and stiffness, contributing materially to the all-round dependability which is synonymous with the words "Wasp" and "Hornet."

THE
PRATT & WHITNEY AIRCRAFT CO
HARTFORD - - - CONNECTICUT
Division of United Aircraft & Transport Corporation

Visit the Pratt & Whitney exhibit, spaces 93, 94, 95, 96, 65, 66, 67 and 68, Building B, at the International Aircraft Exposition, St. Louis, Mo., and see the 300 H. P. Wasp Junior, Wasp and Hornet engines geared and direct drive.

Wasp & Hornet *Engines*

Manufactured in Canada by Canadian Pratt & Whitney Aircraft Co., Ltd., Longueuil, Quebec; in Continental Europe by Bavarian Motor Works, Munich.

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